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TRADE-OFF BETWEEN LOCAL AND FEDERAL FUNDING FOR WASTEWATER TREATMENT FACILITIES

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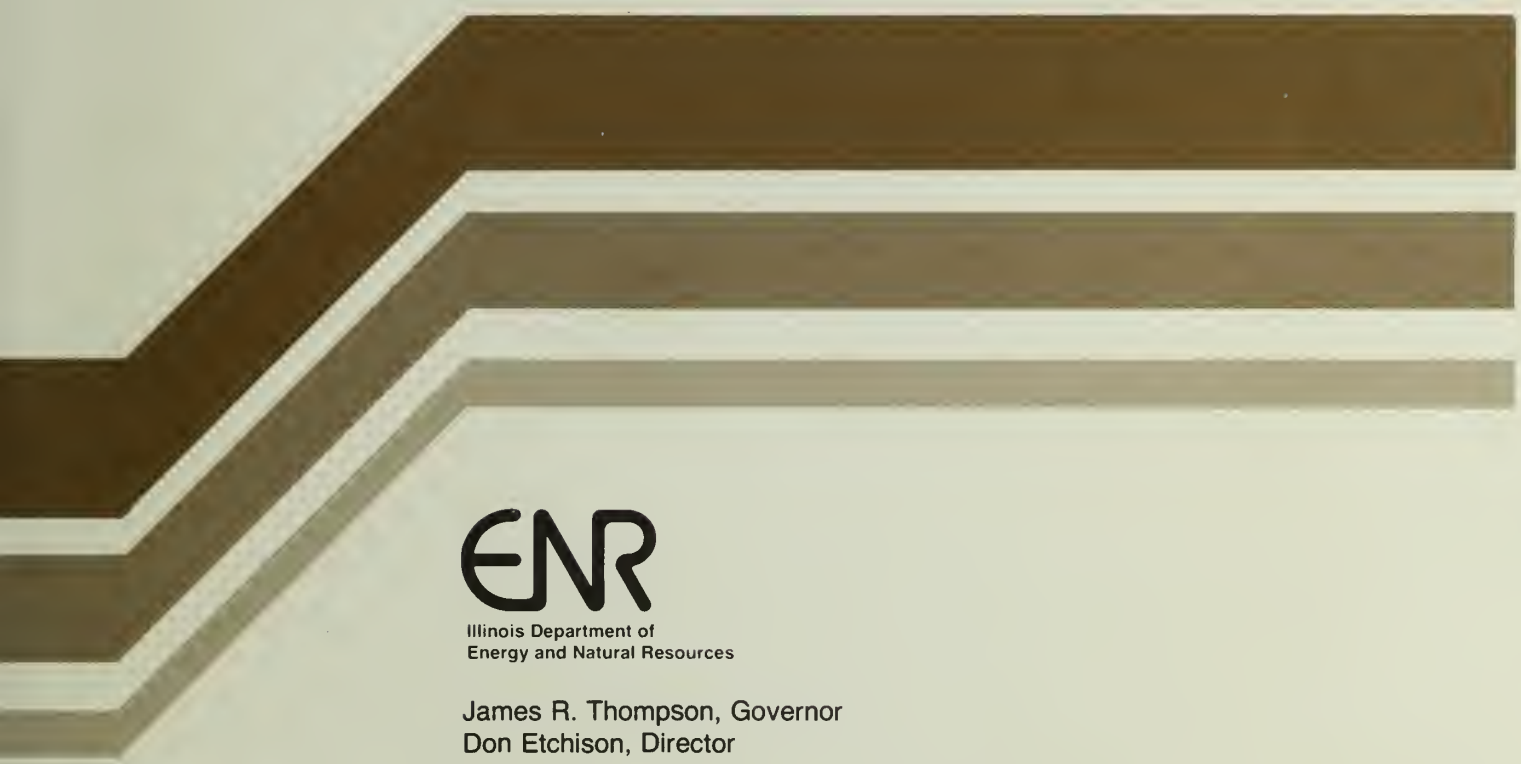

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James R. Thompson, Governor
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RE-EA-85/07

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November 1985

TRADE-OFF BETWEEN LOCAL AND FEDERAL FUNDING

FOR

WASTEWATER TREATMENT FACILITIES

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NOTE

This report has been reviewed by the Department of Energy and Natural Resources (ENR) and approved for publication.

Printed by the Authority of the State of Illinois

Date Printed: November 1985

Quantity Printed: 300

One of a series of research publications published since 1975. This series includes the following categories and are color coded as follows:

	Prior to July, 1982	After July, 1982
Air Quality	- Green	Green
Water	- Blue	Blue
Environmental Health	- White	Grey
Solid and Hazardous Waste	- White	Olive
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PREFACE

The costs of rebuilding and upgrading the infrastructure provided by local governments are quickly reaching the point where local resources are inadequate to meet the standards imposed by the federal government. The outcome has been a greater reliance on federal grants to meet the required outlays for environmental protection. With federal support come requirements. In the case of wastewater treatment, the strings involve both service levels and funding approaches.

The Department of Energy and Natural Resources, State of Illinois, requested that a study be made of the alternatives facing local governments in Illinois with respect to financing the wastewater treatment facilities. The most obvious choice, of course, is to finance the projects locally rather than with federal support and thereby avoid the accompanying federal regulations regarding the imposition of user charges which are not deductible in computing federal income taxes.

Many persons have provided assistance in collecting data for this project. Two surveys of Illinois municipalities were undertaken to gain background on current funding practices. The help of the officials responding must be recognized. Ken Alderson of the Illinois Municipal League provided much insight into issues and problems faced by cities. Ron Drainer and Mike Bowers of the Illinois Environmental Protection Agency assisted in the data collection. Likewise, Bill Tansey of the U.S. Environmental Protection Agency graciously assisted by providing data on municipalities and sanitary districts obtaining federal grants. Ted Horn of the U.S. Environmental Protection Agency provided many useful insights into grant procedures and the federal requirements for user charge systems. Julie Karabin, Jan Briney and Michael Colsch were invaluable in tabulating data, processing the results, and preparing the final report.

As always, the authors are solely responsible for the findings and opinions presented in this report. Comments can be sent to Warren Jones at the Department of Economics, Western Illinois University, Macomb, IL 61455.

WJ
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Note: This study was originally commissioned by the Economic and Technical Advisory Committee in September, 1983.

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EXECUTIVE SUMMARY

The relatively high costs of upgrading and reconstructing wastewater treatment plants in urban areas have caused local public officials in municipalities and sanitary districts to turn to the federal government for financial support. Since the protection of the environment has a high federal priority, support for these construction projects is consistent with overall policy objectives.

However, along with the federal financial support comes regulations both in design and financing techniques. Local officials claim that some of the design requirements exceed local needs, and cities are mandated to collect user charges to finance the operating, maintenance and replacement expenses. Initially the federal government provided 75 percent of the cost of upgrading and/or rebuilding the wastewater treatment facilities. Since the local governments had to provide only 25 percent of the cost, the federal regulations were not particularly bothersome. However, the federal share is now scheduled to decrease to 55 percent and local governments are beginning to question whether the federal financing route is the most desirable in all instances. This is especially true in light of the increased local tax burden resulting from the substitution of a non-deductible user charge for an income tax deductible property tax.

This study examines the question of whether municipalities always benefit by employing a user charge and financing a wastewater treatment facility with a federal grant. Of particular interest is the negative impact on the community from the additional taxes that must be paid when property taxes are not used to finance the wastewater treatment plant.

Background

In analyzing the effects on a local community of financing wastewater treatment facilities with user charges as compared with property taxes, recognition must be given to the fact that many cities already finance sewerage services with a charge added to water bills. There are several reasons for this with the most common being the potentially better allocation of resources due to a more visible pricing system and the fact that residents see user charges as a direct fee for services as compared with property taxes which are less popular (pp. 6-7).

For purposes of this analysis, the effects of switching to user charges as compared with property tax financing have been computed regardless of whether the city had already employed user charges. This approach was employed for two reasons. First is that an objective standard was needed against which to gauge the effects of user charges in all cities. Second is that detailed information by city on when user charges were enacted was not always available. Thus, subsequent analyses will compare the effects of instituting user charges, assuming that user charges are not income tax deductible and that user charges were not already in existence (pp. 32-34).

Methodology

In this project, the net financial benefit to a city from obtaining a federal grant and switching to user charges was computed. The methodology is not particularly complex but requires many detailed calculations which at first glance appear confusing. Figure II provides a schematic of the process. Essentially it is as follows. The total operating, maintenance, and replacement (O,M,&R) costs must be financed by a charge imposed on users by class. Thus, to determine the amount of user revenues collected the total O,M,&R must be apportioned across the user classes. If a city did not obtain a federal grant, then the costs of the wastewater treatment services are

apportioned by property taxation which results in a different distribution of costs among user classes. In the second case, the property taxes are deductible expenses in computing federal income taxes for all user classes. In the first case, the user charges paid by individuals are not tax-deductible even though the user charges are deductible for business and industry.

When the amount of property taxes to be replaced by user charges has been determined, the marginal tax rates in effect for individuals and businesses must be computed. The tax increases for residents are fairly simple to compute from the tax tables based on the number of persons per household and family income obtained in the Census of Population.

Individuals are also affected, however, by the fact that some of the user charges and property taxes are shifted by business and industry either to residents outside the community or to local residents. When the shifting occurs, the residents are affected by the changes in financing methods again. The various assumptions about shifting patterns are explained in detail within the text (p. 36). Because the professional literature on tax shifting and incidence is not well-developed, the results are presented using several alternate assumptions about shifting patterns. The reader can see the sensitivity of the results to different shifting assumptions. Assumptions also had to be made about the tax rates faced by the business community.

Once the reduction in local disposable income in the community resulting from a switch from property taxes to user charges has been computed, a multiplier reflecting the negative effects from the loss in income must be applied to fully capture the effects of these reduced expenditures (pp. 36-43).

Sample Characteristics

Since it was not feasible to carry out all of the calculations for each municipality in Illinois, a sample of municipalities had to be drawn. The

sample was drawn from the set of cities that had or were scheduled to receive federal grants for wastewater treatment. This list, obtained from the Illinois Environmental Protection Agency, included 197 municipalities and sanitary districts. A random sample of 60 municipalities and sanitary districts, stratified by population size, was drawn. Detailed information for 41 units of these governments was available from the files of the U.S. and Illinois Environmental Protection Agencies (p. 30).

To ascertain that the sample of local governments in Illinois approximated the statewide population, a comparison of basic socioeconomic characteristics including population size, per capita income, and number of residents per household is provided (Table 2). In the case of the municipalities, the sample population closely approximated the universe when account is taken that the Chicago metropolitan area cities were excluded because the Metropolitan Sanitary District of Greater Chicago is exempt from the user charge requirement. Detailed socioeconomic characteristics are not available for sanitary districts so a comparison of this sample with the universe could not be undertaken. However, there is no reason to think that the findings would vary from those for the municipalities and the samples were accepted as representative of the universes from which they were drawn.

Financing Patterns

As background for appraising the effects of switching to user charges, a brief overview of financing patterns of municipalities for sewerage treatment is provided (pp. 6-7). User charges were in effect in 511 of the 1235 municipalities responding to the 1982 Census of Government survey.

To more fully understand the alternate financing methods, three city groups are compared. First is the universe of Illinois municipalities disregarding the presence of user charges. Second is a subset of municipalities reporting sewerage user charges currently in effect. Third is

a further subset including only those municipalities which reported current expenditures for sewerage services (pp. 17-27).

The analyses brought forth several interesting findings. First is that municipalities employing user charges also collected higher per capita property taxes. Second, while 357 municipalities collected user charges for sewerage services averaging $87.08 per resident, 511 municipalities reported current expenditures for sewerage treatment. Thus, many cities are financing the sewerage treatment services without user charges. The most likely source of funding is through property taxes. A third finding is that the cities which impose user charges for sewerage treatment are not "user-charge prone", that is, they do not make heavy use of user charges for other services. This is consistent with the notion that the federal government requirements provide a stimulus for adopting user charges in financing sewerage treatment facilities.

Calculations of Annual Net Financial Benefit

The main thrust of this project involves calculating annual net financial benefit. The annual net financial benefit is the difference in local disposable income between two alternatives for financing a sewerage project. The first alternative is to accept a federal grant and collect O,M,&R costs with the required system of user charges. The second alternative is to finance the entire project locally. Under this second alternative, the debt service and the O,M,&R costs are both collected with the property tax. If positive, local annual disposable income is higher with the federal grant, despite the system of nondeductible user charges. If negative, local disposable income is higher without the federal grant.

This study shows that annual direct financial benefit varies widely between sample units. Of the 36 municipalities and 5 sanitary districts in

the study, 14 municipalities had negative net financial benefits under certain conditions. At least one municipality in each population category had negative net financial benefits. For the sample municipalities of 25,000 residents or more, average per capita net financial benefits were negative. A decrease in federal cost sharing from 75 to 55 percent increases the probability that a federal grant reduces local disposable income (pp. 47-66).

Changes in Annual Federal Taxes

Federal taxes increase because user charges are not deductible in the calculation of federal personal income tax liability and because costs are redistributed among the classes of users which have different marginal tax rates. This nondeductibility effect is calculated in the process of estimating the net financial benefit of the federal grant. The estimated increase in federal taxes is expressed as a percentage of the federal grant and is an estimate of the percentage of the federal grant amount returned to the federal government through higher federal taxes. The estimates vary widely among sample units. In one case, the municipality of Chicago Heights, it is estimated that federal taxes decline.

As a group, Illinois municipalities and sanitary districts return an estimated 13.4 to 32.9 percent of total grants to the federal government through higher federal taxes. These estimates are for 75 percent federal cost sharing. With a reduction in the federal cost share to 55 percent, the estimates range from 18.3 to 44.8 percent (pp. 45-47).

Changes in Annual Disposable Income

The impact on annual local disposable income when a municipality accepts a federal grant consists of two parts. First, the grant effect reduces local annual debt service because part of the construction cost is paid by the federal government. The second part consists of the changes in local disposable income resulting from the required change in the method of

financing annual operating costs from property taxes to user charges. This second part, in turn, consists of the nondeductibility effect, redistribution of costs among user classes, and the shifting of changes in costs to nonresidents. The estimates of this second part of net financial benefit are independent of whether or not a municipality receives a federal grant. They are estimates of the impact on local disposable income of a change from the property to a system of user charges for financing O,M,&R costs. These estimates vary substantially between sample units.

For 31 municipalities and 1 sanitary district, the change in revenue source decreases disposable income. These estimates suggest that for a number of municipalities and sanitary districts, a change in revenue sources for financing wastewater treatment from the property tax to user charges may have detrimental impacts on local disposable income. Such changes should be considered carefully. However, user charge systems are not always detrimental in terms of their impact on local disposable income. For five municipalities and four sanitary districts, disposable income increases. This is due to a substantial shifting of costs to sewerage users who, in turn, shift these costs to nonresidents (pp. 47-66).

Recommendations

This study underscores two points. The first is that local disposable income with a federal grant mandating a system of user charges may be lower than if the grant were not accepted. The net financial benefits of a federal grant may be negative. Second, a change in the method of financing O,M,&R from the property tax to a system of user charges may reduce local disposable income, regardless of the reason for the change. These issues deserve further study. For the estimates of net financial benefit of federal grants, the current study has a limitation. This is the lack of detailed historical

information concerning revenue sources prior to the acceptance of the federal grant. The property tax is assumed to be the revenue source replaced by the user charge system. Since sample units may have been using some other revenue source or combination of sources, it may be argued that the estimates are hypothetical rather than historical.

If this objection is considered important, then an appropriate recommendation is that a method be found for determining this historical information. Attempts to obtain this information for this study by survey were not successful. While officials were anxious to assist, the required information is detailed and not readily available to them. Any effort in this area should be directed to the municipalities and sanitary districts in this study to limit the expense involved.

There are no similar objections to be made to the estimates of the impact on disposable income of a change in revenue source. In making the decision to change from property tax to user charge financing, it is precisely these hypothetical outcomes which should be considered. The reduction in disposable income is a potential negative aspect of the change which may be important in making the decision. This study could be expanded to determine the conditions under which the change in revenue sources has a beneficial or adverse impact on local disposable income (pp. 74-75).

TRADE-OFF BETWEEN LOCAL AND FEDERAL FUNDING FOR WASTEWATER TREATMENT FACILITIES

The decaying state of the public infrastructure across the United States is widely recognized. Streets, bridges and sewer systems in America's cities are often in a sad state of disrepair with little hope of making the necessary repairs from existing local revenues in the immediate future. As with many areas of public concern, the Federal government has actively assisted local governments in improving environmental conditions by providing financial support for building, repairing and/or expanding the local infrastructure.

Background Information

Federal financial support often brings requirements either for output standards or operating practices. Record-keeping practices must be expanded, higher performance standards must be met, and additional local personnel may be needed to provide the services at the required level. These constraints have elicited much criticism from local officials frustrated with both the grant applications process and the additional requirements imposed subsequent to receipt of the funds.

Listening to complaints by local officials regarding added requirements associated with federal grants might cause one to ask why funds are requested. The common response is that the project costs are so high (especially in the case of smaller governments) that the legislated mandates could not be financed with local funds alone.

The case of wastewater treatment is no exception. Legislated mandates about sewerage treatment have substantially increased the costs of processing sewerage and wastewater. Local governments are required to make substantive improvements in the treatment process with the promise of a federal grant of up to 75 percent of the project costs. Local governments accepting a grant must meet requirements about apportioning the costs of the improved wastewater

treatment plant among user classes and must adopt a system of user charges to finance this service. In addition to required changes in financing, local governments must work within the federal guidelines imposed in the grant.

The federal requirements to receive intergovernmental aid and the level of federal support raise an interesting practical question. Could a local government finance wastewater treatment facilities with local property taxes, rather than user fees, at a lower total cost to taxpayers than through a federal grant? The answer to this question involves consideration of the loss of deductibility of user charges from federal income tax liability, the fact that local revenues are leaving the local government and therefore are not reinvested in the community, and the claim by local officials that the federal standards imposed on treatment facilities as a requirement for obtaining funds exceed those that would be voluntarily adopted by residents.

The situation is complicated by the federal government reducing the funding rate for wastewater treatment facilities. That is, local governments were accustomed to receiving 75 percent of the project cost and, under current policy, will receive 55 percent. The lower federal contribution, combined with the requirement that user charges by used to make the operating and maintenance portion of the wastewater treatment facility self-sufficient, makes the loss in income tax deductibility an important consideration in selecting among methods for financing the facilities.

This study examines the trade-off between financing the construction and operation of a wastewater treatment facility with property taxes having federal income tax deductibility, compared with financing construction partially with federal grants and operations with the federally required user fees. In essence, the project involves a "what if" scenario in which a random sample of municipalities and sanitary districts in Illinois are modeled under

several hypothetical situations.

Overview of Study

While at first glance the question raised seems relatively straightforward, its simplicity is misleading. First is the fact that wastewater treatment is financed in more than one way in Illinois and there is little consistency in the approaches chosen. In some areas, a sanitary district, including a city(ies), levies property taxes and collects user charges from residents both within and outside the incorporated areas. In other areas, municipalities are responsible for financing wastewater treatment and the service is limited to residents within the municipal boundaries.

Second, since wastewater treatment facilities are a relatively large capital expenditure, a single project may span several years, greatly complicating an interpretation of the trade-off between property taxes and user charges during any one period.

Third is the difficulty involved in determining tax liability faced by various groups within the community. Some property taxes are shifted forward to consumers while others are not. Even in cases when taxes are shifted, they are not all shifted to the same extent. Income tax rates differ by income levels and class of taxpayer which requires specific assumptions about tax deductibility.

Fourth is the absence of a single source of detailed information about user charges collected and methods of financing. Information obtained from multiple sources is not always consistent and requires much cross-checking and verification from a second source.

These difficulties are not unique to this research project and researchers have developed methods of approximating information or making assumptions at critical points in the analysis. This project is not noticeably different and the important assumptions are clearly stated

throughout the report. The data on which the calculations are based are provided and readers interested in altering the assumptions to determine the sensitivity of the findings can do so.

Issues

Understanding the effects of alternate methods of financing sewerage and wastewater treatment facilities requires a basic understanding of several issues involving user charges and financing arrangements.

a. User Charges. For many years, economists have promoted user charges as a method of financing local services. User charges, in theory, should improve the allocation of resources because consumers/taxpayers face the price of the service they are consuming at the time the purchase is made. This compares, for example, with property taxes which are viewed by taxpayers as a flat sum and not subject to the amount of public service requested.

While user charges make sense for controlling consumption in some instances, they also have disadvantages. Of particular importance is their regressivity. Low income families are likely to spend a much greater proportion of their incomes on basic necessities such as food, water, and housing than are wealthier families. One might expect that a water bill for a low income family represents a larger percentage of family income than for a wealthy family. An undesirable effect of user charges is that they can discourage consumption of socially desirable services. In an effort to lower living costs, a family might be tempted to dispose of trash along the roadside as compared with paying a refuse collector to pick the trash up at regular intervals. During periods of dry weather, but without a critical water shortage, a community may wish to encourage lawn watering to maintain an attractive community appearance. User charges would probably work against these efforts.

An attractive feature of a user charge for financing local services is the direct connection with benefits received. Residents can see that greater consumption of electricity or water is reflected in the following monthly bill. Taxpayers feel greater responsibility for the costs associated with the services enjoyed.

User charges do not affect all classes of taxpayers in the same fashion, however. Residents cannot deduct user charges from federal income tax liability because user charges are not considered as taxes even though they are compulsory payments for essential services and, in some cities, are financed with property taxes that are deductible from income taxes.

Businesses, on the other hand, can deduct the user charges as a business expense. Thus, one finds an interesting situation when a resident uses part of his or her home as a business and deducts a portion of the user charge as a business expense while the user charge for the remaining portion of the home is not deductible. A resident in a neighboring community with no home business but in a city with property tax financing claims his or her entire property tax bill (including the portion for wastewater treatment and water distribution) when filing income taxes.

b. Intergovernmental Grant System. In addition to the deductibility issues, questions about distribution of wastewater treatment grants are also interesting. The applications process is relatively long and involved with cities being placed on approved grants lists but with much uncertainty about the amount of funds and the timing of receipts. In order to quality for funds, cities must meet regulations regarding methods of treatment, size of plant, and a host of other considerations well in advance of notification that funding will be provided by the federal government.

Not only is the type of service subject to federal regulation, but the method of financing is also mandated. Local governments must demonstrate that

the users of the wastewater treatment system pay according to the amount of service received. Furthermore, user charges are required and local officials do not have the option of using property taxes for financing this service.

By giving up the deductibility of property taxes, residents/taxpayers have no certainty that the amount of local funds leaving the community will be matched by the funds returned in federal grants. Thus, it is entirely possible that the loss in federal income tax deductibility from what would have occurred under a property tax system of finance when examined in terms of the local multiplier effects could conceivably exceed the revenues received from the federal grants for the wastewater treatment project.

Alternative Revenue Sources

Prior to explaining the methodology for determining the differential effects of changing the financing approach, it is useful to review the alternate methods of financing wastewater treatment in Illinois. Local governments have several financing options available. First is the general property tax levy. Some municipalities levy a property tax to finance their sewerage treatment facilities. The cost of levying the property tax is relatively low since it is merely incorporated into the other property tax bills. As noted above, the obvious advantage of the property tax approach is the deductibility on the individual federal income tax return. This is particularly attractive for high income families. While economists can argue that resource use is better controlled with user charges, one could question the increase in use of water or wastewater treatment by residents when property taxes are used compared with user charges. Lawn watering might come to mind but one might question whether price is a very important consideration in choosing how much lawn watering will occur by residents, especially those at mean income or above.

Perhaps the more important consideration by local public officials in selecting among alternative financing methods is the anti-property tax sentiment of the recent past. By moving to user charges, residents/taxpayers did not perceive the cost of wastewater treatment as a tax but rather a price paid directly for a service. In fact, many residents may not even realize that user charges increase the net cost of water and sewerage treatment services by the cost of their marginal tax rate.

The second method of financing is the user charge approach in which a charge for sewerage treatment is either included in the water bill of shown separately on the water statement. These costs are usually calculated by a consulting engineer who testifies at a council meeting as to the projected costs and revenues needed to keep the enterprise fund on a solid financial footing. These calculations and recommendations usually receive considerable attention from the press which helps justify the council's actions to increase water or sewerage charges. In essence, the responsibility for the increases in public service costs is passed on to the consulting engineer who represents the private business approach to government.

To provide insight into the extent to which user charges versus property taxes are currently employed, Illinois cities who employ user charges and who reported current operation expenditures for sewerage treatment are presented in Appendix A. Due to the possible overlaps in method of financing and the complicated nature of the financing procedure, three approaches are presented. First is an overall profile of revenue instruments used in financing municipal services in Illinois. Second is a subset of those municipalities which reported expenditures on current operations for sewerage treatment in the 1982 Census of Governments. Third is a further subset of those municipalities who reported both current expenditures for sewerage treatment and user charge collections for sewerage treatment.

Methodology

The methodology used in this study is relatively straightforward. The revenues that would have remained in the local community, if property taxes had been collected rather than user fees, are calculated based on assumptions regarding tax shifting, tax rates in effect, and collection levels. These revenues are then multiplied by a local economic base multiplier to determine the effect which the additional spending would have had on the local community. The outcome is then compared with the federal portion of the project, assuming 55 percent reimbursement. This comparison will indicate whether the residents would have been better off financially by using local funds to finance the project than by relying on federal aid and losing the income tax deductibility.

a. Determining Proportionality. An important component of the subsequent analysis involves distribution of the user charges among those receiving services. A property tax distributes the cost of service on the basis of assessed valuation. However, PL 92-500, of 1974, prohibited the use of ad valorem taxes to finance wastewater treatment when the project was financed by federal grants because there is no direct relationship between value of property and use of the sewerage treatment system. The user charge system must, in some manner, estimate the amount of use by each type of payer and then apportion the costs accordingly.[1] The typical user charge consists of a basic charge per unit of flow and surcharges based on flow characteristics such as pounds of suspended solids.

Determining level of service to residential users is accomplished with water meters. The assumption is that water entering the building leaves through the sewer and the effluent is homogeneous within this user classification.

Calculating the amount of service received by industry and commercial establishments is not so easy, however, since there is great variability among users in both the volume and types of waste discharged. Some effluent is much more costly to treat so a distinction must be made as to type of user and waste discharged. The complicated nature of determining the effluent levels and types has created the need for a scheme to incorporate volume, strength or delivery flow rates of industries into the user charge system. Commercial establishments are frequently metered in the same manner as residents. The industrial customers pose the most significant difficulties in determining rates.

b. Tax Rates. Since the main focus of this project hinges on the deductibility of property taxes, but not user charges, a crucial component of the analysis involves the tax rates paid by both residents and industries. Since detailed, current income tax receipt information is not readily available for Illinois municipalities and sanitary districts, it was necessary to rely on published information concerning median family income and average family size to compute an income tax bill.

Computing a meaningful income tax rate for residents is particularly important because of the differences between user charges and property taxes with respect to income taxes. For commercial and industry customers, both property taxes and user charges are deductible against federal income taxes and there is no particular reason to think that one is shifted differently from the other.

Thus, for present purposes, per capita income was adjusted for the average family size to determine the number of exemptions and the assumption was made that the standard deduction was employed. In other words, the families employed the short form in computing federal income tax payments. The estimates of taxable income and estimated federal marginal tax rates are

presented in Appendix B. The schedule of federal marginal tax rates for 1984 are presented in Appendix C.

c. Multiplier Effect. Retaining income in the community rather than paying federal income taxes means that the funds can be invested in banks or spent within the community thereby adding to the local income stream. Certainly not all of the funds will be invested or spent locally and the amount of the multiplier effect is a function of the local expenditures.

Many studies of local multiplier effects have been conducted with mixed findings. The nature of the local economy, preferences of residents, income levels, savings habits, and age all make a substantive difference on expenditure or investment habits. Several multiplier levels have been employed in this study to provide evidence on the sensitivity of the findings.

Sample Characteristics

Since the results of this research effort are dependent on the characteristics of the sample municipalities and sanitary districts, it is important to compare these characteristics with the overall state population. A map showing the locations of these municipalities is presented in Figure 1. These comparisons must, by necessity, be imprecise because detailed socioeconomic information for residents in sanitary districts are not readily available. However, comprehensive information on municipal populations exist and are presented in Table 1.

To compare the sample observations, three sets of data are included. First are the general population characteristics including minorities, number of households and density. This information is useful in applying the findings to observations outside the sample used in this study.

FIGURE 1

MAP OF SAMPLE CITIES IN ILLINOIS

1. Addison
2. Albers
3. Bloomington
4. Bryant
5. Carbondale
6. Champaign
7. Chicago Heights
8. Cobden
9. Danville
10. Deerfield
11. De Kalb
12. Fairfield
13. Farina
14. Fillmore
15. Flat Rock
16. Grantfork
17. Grant Park
18. Hoopeston
19. Jerseyville
20. Jonesboro
21. Libertyville
22. Marine
23. Merrionette
24. Moline
25. Mounds
26. Mount Carmel
27. Mount Prospect
28. Naperville
29. Nokomis
30. Normal
31. Palatine
32. Pleasant Hill
33. Prairie Du Rocher
34. Shipman
35. South Beloit
36. South Chicago
37. Springfield
38. Sterling
39. Tamms
40. Urbana
41. Vergennes
42. Waynesville
43. Willow Hill

Illinois has a large number of relatively small municipalities and in order to obtain reasonable estimates of the impact of alternate policy options, the sample must be representative of the municipalities statewide. A profile of the city size distribution in Illinois is presented in Table 1. Overall, 9,559,999 Illinois residents were in areas with municipal government for a statewide total or 83.7 percent. However, there were 627 communities with populations of less than 1,000 residents but these residents represented only approximately 3.1 percent of the urban population. Only 12 percent of the urban population resided in municipalities with populations of fewer than 5,000 residents.

The sample city attributes are presented in Table 2. The average population size is 15,230 and the cities ranged from Grantfork in Madison County with a population of 268 to Springfield, the state capitol, with a population of 99,627 in 1980. In selecting the cities, the universe was stratified by size and the sample was drawn randomly within each population group. It is especially important that the cities be drawn from several size groupings in order to effectively project the results to the state population.

Additional background information on the cities indicates that the number of households averaged 5,963 and ranged from 40,960 to 92. In some sense, number of households provides at least a broad indication of the residential users in the sewerage system. A second measure of the residential users is the number of persons per household. In the sample, the average was 2.66 persons per household compared with a statewide average of 2.76.[2]

Since the effect of differences in funding approach and shifting of the burden to the Federal Government depends on the incomes of residents, it is also important that the incomes within the sample municipalities approach those of municipalities statewide. Because 83.7 percent of the state population resides in areas with a municipal population, it is reasonable to

TABLE 1

Illinois Municipal Governments by Size, 1980

Size Categories	Number of Municipalities	Population	Cumulative Population	Cumulative Percent
200,000 or larger	1	3,005,000	3,005,000	31.4
100,000 to 199,999	2	264,000	3,269,000	34.2
50,000 to 99,999	17	1,133,000	4,402,000	46.1
25,000 to 49,999	44	1,541,000	5,943,000	62.2
10,000 to 24,999	113	1,785,000	7,728,000	80.8
5,000 to 9,999	97	689,000	8,417,000	88.0
2,500 to 4,999	127	459,000	8,876,000	92.9
1,000 to 2,499	252	394,000	9,270,000	96.9
Less than 1,000	627	289,000		
TOTALS	1,280		9,559,000	100.0
Percent of Population with Municipal Government				83.7

Source: U.S. Bureau of the Census, Governmental Organization, 1983, Volume 1, Table 6.

TABLE 2

INCOME AND PLUMBING CHARACTERISTICS

Municipality	% Lacking Plumbing (complete)	Per Capita Income	Median Family Income
Addison	1.05%	$8,521	$27,413
Albers	1.92	6,181	20,052
Bloomington	1.48	8,327	21,640
Bryant	6.67	6,883	20,536
Carbondale	2.25	5,271	17,699
Champaign	3.97	7,301	22,149
Chicago Heights	1.71	6,795	21,206
Cobden	1.63	5,309	13,933
Danville	2.34	7,339	18,910
Deerfield	0.15	14,195	41,383
De Kalb	1.54	6,405	23,597
Fairfield	2.15	6,568	16,157
Farina	1.55	7,318	18,080
Fillmore	2.70	5,364	15,139
Flat Rock	0.54	5,803	18,125
Grantfork	4.34	6,388	19,000
Grant Park	1.86	7,304	20,391
Hoopeston	1.36	6,524	18,627
Jerseyville	1.93	6,921	17,941
Jonesboro	1.10	5,950	14,926
Libertyville	0.58	10,908	34,953
Marine	0.59	6,703	19,625
Merrionette Park	0.21	8,511	22,924
Moline	1.11	9,131	24,017
Mounds	5.89	3,901	10,433
Mount Carmel	1.05	7,540	19,534
Mount Prospect	0.46	10,767	30,617
Naperville	0.52	11,142	36,685
Nokomis	2.10	6,767	17,991
Normal	1.40	6,709	26,452
Palatine	0.43	10,844	33,443
Pleasant Hill	0.64	5,584	13,826
Prairie du Rocher	0.39	5,479	15,714
Shipman	1.96	6,339	19,479
South Beloit	0.89	6,633	18,470
So. Chicago Heights	1.46	7,114	20,988
Springfield	1.19	8,236	21,254
Sterling	1.19	8,323	22,786
Tamms	4.66	5,003	13,060

Municipality	% Lacking Plumbing	Per Capita Income	Family Income
Urbana	1.47	6,717	20,717
Vergennes	4.58	6,444	17,500
Waynesville	0.95	6,502	20,083
Willow Hill	4.95	5,164	11,806
Mean	1.88	7,235.53	20,913
Standard Deviation	1.54	1,936.85	6,415

Source: U.S. Department of Commerce, Summary Characteristics for Governmental Units and Standard Metropolitan Statistical Areas (Washington, D.C.: U.S. Government Printing Office, 1982) PHC 80-3-15.

use the state per capita income level as a basis for judging the comparability of the sample characteristics. The statewide per capita income in 1979 was $8,066[3] compared with an average for the sample municipalities of $7,236 for a difference of 11.5 percent. An obvious explanation is that the Chicago suburbs are higher income municipalities but they are excluded from this study because the Metropolitan Sanitary District of Greater Chicago is exempt from the requirement to employ user fees. Thus, the estimates of tax-savings from not imposing user charges are likely to be slightly understated for the complete municipal population within Illinois. However, it is likely that this municipal sample reflects income characteristics of the downstate cities fairly well.

Another useful income comparison is median family income. The sample municipalities averaged $20,913 compared with a state average of $22,746[4] for a difference of 8.8 percent. The same rationale for the differences between the sample and universe applies and the estimates are close enough to have confidence that the sample municipalities reasonably reflect income characteristics in the downstate municipalities.

A final population characteristic included in this comparison is the percentage of houses lacking complete plumbing facilities. This characteristic is interesting because it provides insight into the condition of the residential property which is connected to the sewerage treatment system. In the sample municipalities, an average of 1.88 percent of the housing units lacked plumbing facilities for exclusive use compared with an average of 1.7 for the state.[5] Thus, the housing stock as measured by plumbing facilities in the sample cities closely represent those in other municipalities.

This brief overview of socioeconomic data indicates that the sample

cities selected from the FOAMRS group quite closely match Illinois cities. In cases where the sample statistics do not reflect the Illinois municipal population, the fact that Chicago metropolitan cities were not included explains some of the variations.

Financing Sewerage Treatment

To place the user charge/property tax discussion in perspective, it is useful to review the financing patterns of Illinois municipalities and sanitary districts. As noted earlier, arrangements for providing sewerage treatment services vary markedly throughout the state. While financial data are available for both municipalities and sanitary districts, a comparison between the latter is complicated by the lack of information on population residing within the districts.

a. Illinois Municipalities. A profile of the major revenue sources for Illinois municipalities in 1982 is provided in Table 3. Per capita amounts collected and number of cities reporting are shown to facilitate the comparison. A difficulty in making comparisons is that not all municipalities collect all revenues which means that tradeoffs between revenue sources are occurring. Municipalities which are highly reliant on one revenue source are probably collecting little or nothing from another source.

Virtually all Illinois municipalities report property tax collections with the average being $46.32 per capita. While this is not the largest single revenue source reported, it is the most important when the facts that it is reported by virtually every municipality and that only one or two revenue sources surpassed this level are considered.

Closely following property taxes are general sales taxes, another almost universal revenue source. An average of $45.17 per resident was reported with considerable variation by city size (not shown) and location within the state. One can quickly realize that municipalities with a major shopping center have

TABLE 3

MUNICIPAL REVENUE STRUCTURE
(All Illinois Municipalities)

Revenue Source	Number Reporting	Per Capita
Taxes:		
Property Taxes	1235	$ 46.32
General Sales	1197	45.17
Public Utilities	209	39.90
Other Selective Sales and Gross Receipts	307	2.70
Motor Vehicle License	350	5.38
Taxes, nec	906	7.84
Intergovernmental Aid:		
Federal	318	71.91
General Revenue Sharing	1209	9.29
State		
General Local Support	1239	19.29
Highways	1245	12.93
Other	835	17.80
Local Transfers	216	8.52
Charges:		
Airport	18	5.01
Hospital	12	513.66
Highway	5	8.98
Parking Facilities	120	3.59
Parks and Recreation	229	6.83
Sewerage	369	83.55
Other Sanitation	247	11.19
Other Charges	355	16.73
Interest:	923	19.23
Misc. General Revenue, nec:	1081	21.01

Source: U.S. Bureau of the Census, Census of Governments, unpublished data, 1982.

larger per capita receipts and cities with declining downtowns have relatively small amounts.

Many of the revenue sources shown in Table 3 are local option and not used by a large number of cities. For example, utility taxes of $39.90 per resident were reported by only 204 municipalities statewide and motor vehicle licenses were reported by 350.

Of primary interest for a study of the financing of wastewater treatment is the adoption of user charges and the extent to which they contribute to the financing of municipal services. Among Illinois municipalities providing information in the 1982 Census of Governments survey, 369 reported collecting user charges for sewerage treatment with an average amount collected of $83.55 per resident. In all probability, this is a combined water/sewer bill and would represent an average charge of slightly less than $7 per resident per month.

An interesting question arises as to the manner in which cities that do not collect a sewer charge finance these services. There are several possibilities. First is the possibility that some cities are served by special districts and therefore do not have primary responsibility for these services. Second is the possibility that cities, without federal grants, are not constrained by the need for user charges and therefore may be using general property tax levies.

b. Cities with Sewerage User Charges. The relative importance of user charges in municipal finance is facilitated with a detailed examination of those municipalities which collected sewerage user charges in 1981-82. Summary statistics for this population subset are presented in Table 4.

The average municipality collecting sewerage charges also collected $54.28 per resident in property taxes. This compares with an average of

TABLE 4

MUNICIPAL REVENUE STRUCTURE
(Municipalities Collecting Sewerage Fees)

Revenue Source	Number Reporting	Per Capita
Taxes:		
Property Taxes	369	$ 54.28
General Sales Tax	366	52.62
Public Utilities Tax	60	31.83
Other Sel Sales and Gross Receipts Tax	130	1.43
Motor Vehicle License	129	4.87
Taxes, nec	301	5.53
Intergovernment Aid:		
Federal	128	73.85
Gen Rev Sharing	362	10.31
State		
General Local Support	362	19.40
Highways	364	12.85
Other	309	27.46
Local Transfers	101	5.66
Charges:		
Airport	9	5.54
Hospital	9	535.10
Highway	2	17.71
Parking Facilities	76	3.51
Parks and Recreation	103	7.17
Sewerage	369	83.55
Other Sanitation	112	10.88
Other Charges	132	8.62
Interest:	339	21.38
Misc General Revenue, nec:	344	18.38

Source: U. S. Bureau of the Census, Census of Governments, Unpublished Data, 1982.

$46.32 per resident for all municipalities in Illinois. This comparison is interesting because rather than there being a trade-off between user charges and property tax collections, the cities, which are collecting user charges, are also collecting more property taxes on the average. While one might think that city size differences are the important consideration, the fact that both revenue sources are adjusted for population means that population has been considered.

The cities collecting sewerage charges also collected higher sales taxes than the statewide average. For all Illinois municipalities, the average sales tax collection per capita was $45.17 compared with an average of $52.62 per resident in the sewerage charge collecting cities.

Making generalizations about the types of cities collecting sewerage charges is difficult without access to socioeconomic characteristics in a cross-listed computer file. However, some insight can be obtained from a review of general revenue sharing receipts. The 362 cities in the user charge subset collected an average of $10.31 per resident from general revenue sharing. This compares with an average of $9.29 per capita for the entire Illinois group. Since general revenue sharing allocations are made using population, relative income, and tax effort, one might argue that the cities with user charges for sewerage treatment are relatively worse-off than the average since their revenue sharing allocations were higher. However, this relationship is tenuous at best since revenue sharing allocations are based on a fairly complicated formula involving similar governments in the county area and the allocations are not made directly at the state level. Also, higher tax effort (associated with higher property taxes) is one of the data elements in the general revenue sharing allocations which means that property tax collections and revenue sharing receipts are interrelated.

Another interesting finding is that the cities employing sewerage user charges are not necessarily prone to user charges in general. A comparison of Tables 3 and 4, for example, indicates that the sewerage user charge subset did not include all of the cities making use of charges for airports, parks and recreation, other sanitation, and related services. In other words, the decision to employ user charges for sewerage financing seems to be an independent decision for a "general attitude" by the city administration or council.

c. Sewer User Charges and Operating Costs. The Illinois cities can be subdivided in yet another manner. Namely, not all municipalities must employ user charges if they spend funds for wastewater treatment. First, if they do not have a federal grant, the requirement for user charges may be moot. Second, it is possible that municipalities contract with a special district for wastewater treatment and therefore only spend funds for a collector system in the city limits. In this case, the city administration may choose to finance services using the general property tax system.

A profile of the revenue structure of municipalities with expenditures for current operations in sewerage treatment is presented in Table 5. In total, 511 Illinois municipalities reported these expenditures compared with 369 cities reporting sewerage user fees. It is interesting to note that of the 511 cities reporting expenditures, only 357 collected user fees for sewerage. This means that 12 cities reported collecting user fees but reported no operating expenditures for sewerage treatment. Several likely explanations exist. First, coding errors in the Census of Governments collection procedure occurred. Second, some user fee systems are used for the collector system within the city but the actual sewerage treatment operations are conducted by another governmental agency.

TABLE 5

MUNICIPAL REVENUE STRUCTURE
(Municipalities with Current Sewerage Expenditures)

Revenue Source	Number Reporting	Per Capita
Taxes:		
Property Taxes	502	$ 55.54
General Sales	489	51.21
Public Utilities	94	34.93
Other Selective Sales and Gross Receipts	171	3.95
Motor Vehicle License	185	5.43
Taxes, nec	400	5.55
Intergovernmental Aid:		
Federal	163	75.67
General Revenue Sharing	491	9.92
State		
General Local Support	490	19.22
Highways	497	12.94
Other	399	22.45
Local Transfers	130	8.95
Charges:		
Airport	7	6.08
Hospital	11	529.33
Highway	3	12.57
Parking Facilities	92	3.44
Parks and Recreation	115	7.07
Sewerage	357	87.08
Other Sanitation	122	10.75
Other Charges	273	17.76
Interest:	362	22.21
Misc General Revenue, nec:	487	22.60

Source: U.S. Bureau of the Census, Census of Governments, unpublished data, 1982.

In revenue collections, the subsets based on user fee collections and expenditures for sewerage treatment are relatively similar. The cities spending funds on current operations for sewerage treatment collected an average of $55.54 per resident in property taxes, noticeably above the all-Illinois average and well above the non-user fee average. These cities collected an additional $51.21 per resident in sales taxes and a substantial number of them employ local utility taxes which returned an average of $34.93 per resident.

This group of municipalities received relatively large federal grants averaging $75.67 per resident compared with a statewide municipal average of $71.91 per capita. One might expect that much of this intergovernmental aid involved wastewater treatment facilities, although Community Development Block Grants and other funding categories may well be represented given the earlier notions about the socioeconomic characteristics of the municipalities.

Based on the information in Table 5, it is clear that among these municipalities, sewerage user fees are very important. The 357 cities reporting revenue from this source averaged $87.08 per capita, far and away the highest user fee category both in amounts collected and in frequency of use.

This comparison of financing patterns among Illinois cities, subdivided as to adoption of user charges or expenditures for sewerage operations yields several observations. First, there does not seem to be a trade-off between user charges and property taxes in that cities that had user charges for sewerage treatment also had higher per capita property tax collections. Second, cities which adopted sewerage user fees did not show up as substantially more "user-charge prone" since many of them did not have user fees for those services which were financed in this way in other cities.

Third, many cities do not finance their current operations in sewerage treatment with user charges. Presumably, the difference between the user charge collections and expenditures are made up with general property tax levies. A more detailed comparison of current operating expenditures for sewerage treatment and property tax collections is provided below.

Expenditures for Sewerage Treatment

The Census Bureau collects information on expenditures by service category for Illinois municipalities. The sewerage expenditure category includes "provision of sanitary and storm sewers and sewage disposal facilities and services, and payments to other governments for such purposes". Thus, this expenditure category includes cities which provide the sewerage treatment and disposal directly or contract with another governmental unit for this service.

To better understand the funding required for sewerage treatment and disposal, per capita expenditures by cities in the three classifications used above are presented in Table 6. For all Illinois municipalities, 511 reported average current operations expenditures of $46.65 per resident. It is interesting that 352 of the cities with user charges for sewerage treatment reported average expenditures of $61.78 per capita. Thus, 148 of the cities subsidized current operations with property taxes and the cities that did not report user charges spent less for current operations.

A total of 181 municipalities spent an average of $74.99 per resident for construction compared with an average of $57.68 per resident for cities with user charges and $60.71 per capita for those cities that reported current expenditures on sewerage operations.

Relatively few municipalities report expenditures for equipment and land (166) and the amount spent is quite small with an average of $5.58 per capita being reported overall. Likewise, only 2 municipalities reported payments to

TABLE 6

1982 Municipal Expenditures for Sewerage

Expenditure Category Per Capita	All Illinois Mun.		Mun. with Sewer Charges		Mun. with Sewer Expenditures	
	No. Reporting	Per Capita	No. Reporting	Per Capita	No. Reporting	Per Capita
Current Operations	511	$46.65	352	$61.78	511	$46.65
Construction	181	74.99	159	57.68	164	60.71
Equipment and Land	166	5.58	60	3.48	165	5.61
Payments to Local Gov'ts	2	14.13	2	14.13	2	14.13

Source: U.S. Bureau of the Census, Census of Governments, unpublished data, 1982.

local governments separate from those included in the current operations category.

The Calculations

To facilitate discussion of information sources, assumptions, and methodology employed, calculations for a mythical City of Example are presented in Table 7, and a schematic is presented in Figure 2. Similar tables were constructed for each of the 36 municipalities and 5 sanitary districts in the sample. The total project cost for the City of Example is $420,000, with $20,000 of project cost not grant eligible. These grant ineligible costs cannot be included in the local share of costs to meet the requirement that 25 percent of project costs be paid locally. The federal share of 75 percent of grant eligible costs is given as a grant of $300,000. The amount of the federal grant to a city or sanitary district and the date approved is obtained from EPA's Grants Information and Control System (GICS) printout. Grant ineligible costs are not readily available except in the project engineer's report, which is not often in EPA files. In addition to the grant ineligible construction costs ($20,000) and the local share of grant eligible construction costs ($100,000), the local cost of the project includes annual expenditures for O,M,&R (Operations, Maintenance, and Replacement). Together these are the three types of costs comprising the total direct local share of project costs.

Receipt of a federal grant for a wastewater treatment project requires the municipality to implement a system of user charges which distributes charges for O,M,&R among the user classes, Residential, Commercial, Industrial, Institutional/Governmental, and Other in proportion to the estimated costs for O,M,&R generated by each class. Illinois municipalities and sanitary districts which are employing federally mandated user charge systems are listed in Appendix D.

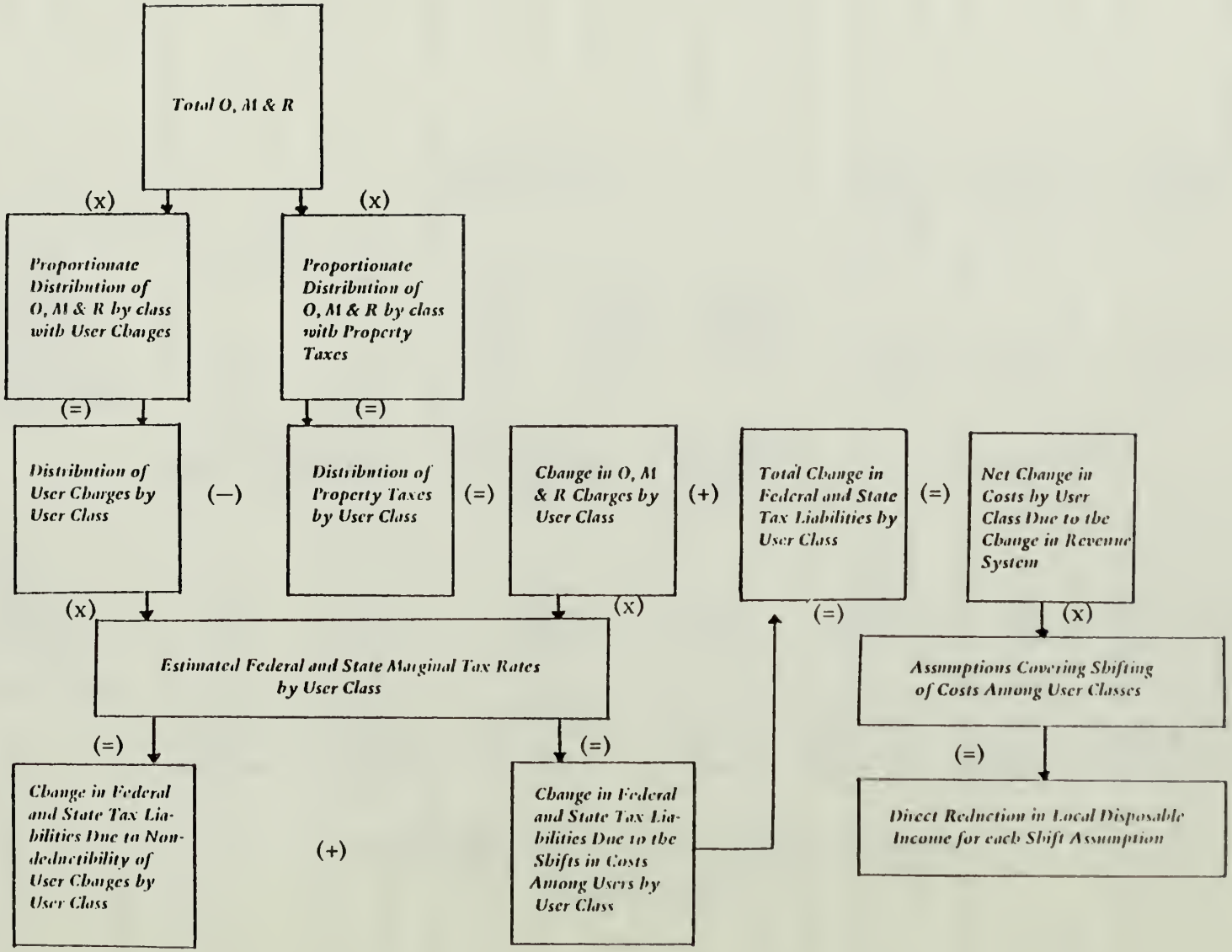
TABLE 7

City of EXAMPLE
EPA File: ILLINOIS
Total FOAMRS O,M,&R: 75,000 DATE: January 1, 1978
Price Adjustment: 1.52 Total O,M,&R 1983 Dollars: 114,000 (1)

CLASS OF USER	(2) PROP. OM&R BY CLASS USER CHARGES	(3) PROP. OM&R BY CLASS PROPERTY TAX	(4) DISTRIBUTION OF USER CHARGES (1) X (2)	(5) DISTRIBUTION OF PROPERTY TAX (1) X (3)	(6) SHIFTING OF OM&R BETWEEN USER CLASSES (4) - (5)	(7) ESTIMATED MARGINAL TAX RATES Fed	State	(8) CHANGE IN TAX LIABILITIES DUE TO COST SHIFT AMONG USERS Federal	State
Residential	.50	.65	57,000	74,100	-17,100	.3	.0275	5,130	470.25
Commercial	.20	.15	22,800	17,100	5,700	.3	.0275	-1,710	-156.75
Industrial	.25	.20	28,500	22,800	5,700	.3	.065	-1,710	-370.50
*Inst./Gov't	.05	0	5,700	0	5,700	0	0	0	
TOTAL								5,130	-57

CLASS OF USER	(9) CHANGE IN TAX LIABILITIES DUE TO NONDEDUCTIBILITY (4) X (7) Federal	State	(10) TOTAL CHANGE IN TAX LIABILITIES (8) + (9) Federal	State	(11) NET CHANGE IN COST BY CLASS (6) + (10)	(12) CHANGE IN COSTS BY CLASS WITH SHIFTING .5	.75	1.00
Residential	17,100	1,567.50	22,230	2,037.75	7,167.75	9,084.38	10,042.70	-11,001.00
Commercial			-1,710	-156.75	3,833.25			
Industrial			-1,710	-370.50	3,619.50			
*Inst./Govn't					5,700.00			
TOTAL	17,100	1,567.50	18,810	1,510.50				
Direct Reduction in Annual Local Disposable Income						-9,084.38	-10,042.70	-11,001.00
Total Annual Reductions in Disposable Income---Multiplier of Two						-18,168.80	-20,085.40	-22,002.00
Multiplier of Four						-36,337.50	-40,170.80	-44,004.00
Multiplier of Six						-54,506.30	-60,256.10	-66,006.00

Figure 2
Schematic For Calculating Disposable Income Changes


Total O, M & R
(x)
(x)
Proportionate Distribution of O, M & R by class with User Charges
Proportionate Distribution of O, M & R by class with Property Taxes
(=)
(=)
Distribution of User Charges by User Class
(—)
Distribution of Property Taxes by User Class
(=)
Change in O, M & R Charges by User Class
(+)
Total Change in Federal and State Tax Liabilities by User Class
(=)
Net Change in Costs by User Class Due to the Change in Revenue System
(x)
(x)
(x)
(=)
(x)
Estimated Federal and State Marginal Tax Rates by User Class
Assumptions Covering Shifting of Costs Among User Classes
(=)
(=)
(=)
Change in Federal and State Tax Liabilities Due to Non-deductibility of User Charges by User Class
(+)
Change in Federal and State Tax Liabilities Due to the Shifts in Costs Among Users by User Class
Direct Reduction in Local Disposable Income for each Shift Assumption

The grant recipient is not required to include full replacement costs in O,M,&R. That is, they are not required to include in O,M,&R replacement the costs of reconstructing the project facility. Current laws and regulations require that replacement costs only include the costs of maintaining the design capacity of the facility over its projected lifetime. However, nothing precludes a community from including reconstruction costs in O,M,&R as well.

When financed by debt issue, the local portion of total project construction costs is amortized into an annual sum for debt service. Under existing laws and regulations, there is no requirement to finance debt service with user charges. The municipality must only demonstrate the ability to collect these revenues. Examination of Illinois EPA files showed that many grant recipients collected debt service through user charges, most frequently through a flat monthly charge per user.

Basic Data Sources

Three main sources of EPA data are used: Illinois EPA grant files, USEPA grant files, and the FOAMRS printout. The FOAMRS printout gives basic information on the municipalities and sanitary districts employing a federally mandated user charge system. Data on the FOAMRS printout includes the type of project, the annual O,M,&R costs, the grant number and the date the data was collected. Study cities fell into three groups based on the sources of available data. For 27 municipalities and 1 sanitary district, data from the Illinois EPA grant file and the EPA FOAMRS printout were available. Data from the USEPA grant file and the EPA FOAMRS printout were available for 9 municipalities and 4 sanitary districts. For the remainder of the cities receiving federal grants requiring user charges for O,M,&R cost recovery, only FOAMRS data was available. Since the FOAMRS printout does not include a breakdown of O,M,&R costs by class of user, detailed tables could not be constructed for these cities.

Price Adjustments for O,M,&R

In Table 7, the City of Example reported $75,000 of O,M,&R costs in 1978. This information is available from the EPA's FOAMRS printout for all grant recipients. Since data on O,M,&R are reported for different years for different grant recipients, price adjustments were employed to convert all O,M,&R dollar amounts to 1983 dollars.

Appendix E gives the price adjustments necessary to convert total O,M,&R for a given year into 1983 dollars. It is derived from the following sets of information. O,M,&R cost indices for pump stations, sewers, and treatment plants for the period 1974 to 1983 (3rd Quarter) are available in EPA's Financial Capability Guidebook, dated March 1984. The Region V USEPA office provided the following breakdown of O,M,&R.

Type of Expenditure as a Proportion of Total O,M,&R

Collection and Conveyance	.17-.18
Pump Stations	.02
Billing	.08-.09
Other Administrative	.03
Treatment	.71-.74

The basis for these breakdowns are surveys done in 1980, 1982, and 1983. The USEPA Region V office makes two observations about this breakdown. First, this breakdown is not publishable as official data because of insufficient coverage in the survey. Second, the variations in the cost breakdown between reporting units are considerable. The justification for using these breakdowns is that there is simply nothing comparable and currently available.

The specific proportions used in computing the O,M,&R price adjustment were:

Collection and Conveyance	.17
Pump Stations	.02
Billing	.08
Other Administrative	.03
Treatment	.70

The EPA cost index for sewers was used to adjust the Collection and Conveyance costs. Billing and Other Administrative costs were adjusted using the Consumer Price Index. For the 1984 O,M,&R costs index it was assumed the percentage increase from 1983 to 1984 in the three EPA indices was the same as the percentage increase in the CPI.

The combined O,M,&R cost index was used to construct the price adjustment necessary to convert total O,M,&R for a given year into 1983 dollars. The combined O,M,&R cost index for 1983 was divided by the combined O,M,&R index for the year that the O,M,&R data were reported. The price adjustment for the City of Example is 1.52. In 1983 dollars, estimated O,M,&R for the City of Example is $114,000.

Distribution of O,M,&R Charges for Property Tax and for User Charges by User Class

Column 2 of Table 7 is the proportion of total user charges paid be each user class. This information is available only from Illinois and U.S. EPA files. In almost all cases, the breakdown of O,M,&R by user class is available for only one year. In many cases, it was also an engineer's estimate provided to demonstrate proportionality of user charge revenues to O,M,&R costs for EPA approval of the user charge system and the release of grant funds. These estimates are assumed to be accurate. In addition, this study assumes that these proportions remain constant over time. The EPA breakdown of user charges allows for a user class called Other. If reported at all, amounts in this user class are very small and are included in the Institutional/Governmental class. For the City of Example, the proportions by user class are assumed to be Residential (.5), Commercial (.2), Industrial (.25) and Institutional/Governmental (.05). The proportions of total user charges paid by class of user for the sample units are listed in Appendix F.

The proportion of property taxes collected from each class in Column 3 is estimated from the 1982 Illinois Property Tax Statistics. For each municipality and sanitary district, the printout indicates the amount of property tax billed to the property classes Residential, Commercial, Farm, Industrial, Railroad, and Mineral. The property classes Farm, Railroad, and Mineral are included in the Industrial category in this study. Even if this assignment is incorrect, the sums involved are minute relative to the totals. The assumed proportions for the City of Example are Residential (.65), Commercial (.15), and Industrial (.20). The assumptions are that the property tax would be the tax deductible alternative to a user charge system. That is, if the 1983 O,M,&R costs were collected with a property tax, they would be distributed in these proportions and the billings by class would not change over time. The proportions of property taxes billed to each class of user in 1982 for the sample units are listed in Appendix G.

Column 4 of Table 7 is the estimated distribution of O,M,&R among the classes of users if the user charge system was employed. It is calculated by multiplying total estimated O,M,&R in 1983 by the proportions in Column 2. The distribution of estimated O,M,&R among user classes with the property tax is summarized in Column 5 of Table 7. This distribution is obtained by multiplying total estimated O,M,&R in 1983 by the proportions in Column 3.

Each method of finance implies different distributions of costs among users. The changes in costs by class of user due to a shift from the property tax to a system of user charges are summarized in Column 6 and are equal to the distribution of costs with the property tax, Column 4, minus the distribution of costs under user charges, Column 5. For our City of Example, the billings to residential users for sewage services decreases by $17,100 per year due to the shifting of $5,700 in additional charges to each of the other three classes of users. To calculate the changes in tax liability due to the

shift in costs among user classes, marginal tax rates are required. These are summarized in Column 7.

Federal and State Marginal Tax Rates

The federal marginal tax rate on personal income for the residential class of users is calculated from information obtained from 1980 U.S. Census data and the 1984 1040 Personal Income Tax Instructions Form. The 1980 U.S. Census provides estimates of per capita income and the number of persons per family for each sample city. Family income for each sample city was calculated by multiplying per capita income by the number of persons per family. The number of persons per family multiplied by $1,000 gives the total exemptions used to arrive at taxable income. This estimate of taxable income is then compared with the 1984 FORM 1040 tax table for couples filing joint returns, assuming standard deductions, to find the applicable marginal tax rate. The estimated federal marginal tax rates on personal income for the sample units are listed in Appendix B. It is assumed that commercial users are sole proprietorships and therefore the federal marginal tax rate is the same as for the residential users. The federal marginal tax rate on personal income is assumed to be .30 in the City of Example. For the industrial class, the federal marginal tax rate of corporate profits is assumed to be .30 for all sample cities. The applicable state marginal tax rate on personal income is .0275 and is assumed to be the same for both residential and commercial users. The state marginal tax rate on corporate profits is .0675.

Federal and State Tax Liabilities

The changes in federal and state tax liability due to the shifting of sewage charges between users are reported in Column 8. They are calculated by multiplying the changes in charges in Column 6 by the applicable estimated marginal tax rate in Column 7. For the City of Example, federal tax revenues

increase by $1,710 and state tax revenues fall by $57 due to the shift in charges for sewerage services among the user classes.

The sewerage charges under the user charge system in Column 4 are not deductible for residential users. Since sewerage charges under the alternate revenue system-- the property tax--are deductible, residential users have an increased federal and state income tax liability. For the commercial and industrial users, both property taxes and user charges are deductible so that there is no impact on tax liability for these user classes. Governmental users have no income tax liability to be affected. This is also true for non-profit institutional users. Lacking a breakdown of charges to profit and nonprofit institutional users, all are assumed to be non-profit.

The increase in federal and state income tax liabilities for Residential users is equal to the charges they pay under the user charge system, Column 4, multiplied by the appropriate marginal tax rate, Column 7. The increase in Federal and state income tax liabilities for the residents of the City of Example are, respectively, $17,100 and $1,567.50.

Column 10 summarizes the total change in federal and state tax liabilities by user class. It is the sum of the change in tax liabilities due to the shifting of charges between user classes, Column 8, and due to the nondeductibility of user charges, Column 9. Federal and state tax revenues increase by $18,810 and $1,510.50, respectively, because of the change from property taxes to a system of user charges in the City of Example.

Changes in O,M,&R Costs by User Class

The net changes in costs arising from the shift from the property tax to user charges is the sum of the shifts in charges between user classes, Column 6, and the total change in tax liabilities, Column 10. These net changes in costs by user class are summarized in Column 11. While the residential class of users in the City of Example found their sewage charges reduced $17,100 by

the implementation of a user charge system, their disposable income is actually $7,167.75 less because of the $22,230 increase in federal and $2,037.75 increase in state income tax liabilities.

Cost Shifting Assumptions by User Class

The figures in Column 11 are not the actual changes in disposable income. They represent only the impact of the change to a user charge system on the recorded expenses of each user class. Through increased prices for their products and services, firms will pass these additional expenses on to purchasers. It is assumed that industrial users pass all of this increase on to purchasers living outside the municipality or sanitary district. While not strictly true in all cases, most large industries probably sell very nearly all of their production to nonresidents. Commercial users sell goods and services to both residents and nonresidents. In the absence of the necessary detailed information on shifting by commercial users, the calculations of the changes in disposable income are made for three shifting assumptions. The first assumption is that one-half of the added costs of sewage treatment is passed on the residential users. The next assumption is that the proportion passed on to residential users is three-fourths. Finally, it is assumed that all of the increased commercial costs are passed on to residential users.

Institutional and governmental users are assumed to pass their added costs on to nonresidents. This is a conservative approach necessitated by lack of information on the exact nature of the institutional and governmental users in each sewage treatment area.

The Reduction in Local Annual Disposable Income

Under these conservative assumptions, only residential users bear the additional expense of the shift from a property tax to a system of user charges. Column 12 of Table 7 reports the incidence of the tax on residential

users under our shifting assumptions. Item 13 in Table 7 is the negative of the sum of Columns 12 and is the direct reduction in disposable income of the residents of the municipality or sanitary district under the three assumptions concerning the proportion of increased commercial costs passed on to residential users. For the City of Example, the direct reduction in local disposable income are $9,084.38, $10,042.70, and $11,001.00 for the proportions of commercial costs shifted to the residential users of .5, .75, and 1.00 respectively.

The preceding are estimates of only the direct reduction in local disposable income. There are additional indirect reductions in local disposable income through the multiplier process. The total reductions in local disposable income for each commercial cost shifting assumption are calculated assuming multipliers of 2, 4, and 6. These reductions are reported in items 14, 15, and 16 in Table 7 for the City of Example.

Table 8 summarizes the estimated direct and total reductions in local disposable income for each assumed multiplier and commercial cost shifting assumption for each municipality and sanitary district in the sample. It is of interest to note that five municipalities and four sanitary districts appear to benefit from the change to a user charge system in the sense that local disposable income is increased.

For the municipality of Carbondale and the sanitary districts in Bloomington-Normal and De Kalb, this occurs only with 100 percent shifting of commercial cost changes to Residential users. For these units, while residential costs are higher under the user charge system, commercial costs are lower. When all of these reduced costs are passed on to local consumers in decreased prices for goods and services, residential disposable income is actually higher. Costs borne by Commercial users are reduced because a substantial proportion of O,M,&R costs are shifted to the Institutional and

TABLE 8

The Estimated Annual Changes in Local Disposable Income for the Sample Municipalities and Sanitary Districts

1. 50 percent of the commercial change in O,M,&R charges shifted to the residential class of users
2. 75 percent of the commercial change in O,M,&R charges shifted to the residential class of users
3. 100 percent of the commercial change in O,M,&R charges shifted to the residential class of users

	The Annual Direct Change in Disposable Income		The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 4)	The Annual Change in Disposable Income (multiplier of 6)
MUNICIPALITIES					
Less than 1,000					
Albers	-4340	1	-8679	-17358	-26036
	-4208	2	-8416	-16832	-25249
	-4077	3	-8154	-16307	-24461
Bryant	-2087	1	-4173	-8347	-12520
	-1895	2	-3790	-7580	-11369
	-1703	3	-3406	-6813	-10219
Farina	746	1	1492	2983	4475
	1492	2	2985	5970	8955
	2239	3	4478	8956	13434
Fillmore	-2546	1	-5093	-10185	-15278
	-2023	2	-4047	-8093	-12140
	-1500	3	-3001	-6001	-9001
Flat Rock	-4381	1	-8762	-17524	-26286
	-4139	2	-8277	-16555	-24832
	-3896	3	-7793	-15586	-23378
Grantfork	-1508	1	-3016	-6032	-9048
	-1678	2	-3356	-6712	-10069
	-1848	3	-3696	-7393	-11089
Marine	-6893	1	-13786	-27572	-41357
	-6600	2	-13201	-26401	-39602
	-6308	3	-12616	-25231	-37847

Table 8 (con't)

	The Annual Direct Change in Disposable Income		The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 4)	The Annual Change in Disposable Income (multiplier of 6)
Prairie du Rocher	-2536	1	-5073	-10146	-15218
	-2441	2	-4882	-9765	-14647
	-2346	3	-4692	-9384	-14076
Shipman	-4443	1	-8886	-17772	-26658
	-4322	2	-8645	-17289	-25934
	-4202	3	-8403	-16806	-25209
Tamms	-5469	1	-10938	-21876	-32813
	-5479	2	-10958	-21916	-32873
	-5489	3	-10978	-21955	-32933
Vergennes	-3244	1	-6289	-12977	-19466
	-3098	2	-6196	-12392	-18588
	-2952	3	-5903	-11807	-17710
Waynesville	-3537	1	-7075	-14149	-21224
	-3451	2	-6901	-13803	-20704
	-3364	3	-6728	-13456	-20184
Willow Hill	-8785	1	-17570	-35140	-52711
	-8817	2	-17634	-35269	-52903
	-8849	3	-17698	-35397	-53095
1,000-4,999					
Cobden	-5923	1	-11846	-23692	-35539
	-4726	2	-9452	-18904	-28355
	-3529	3	-7057	-14115	-21172
Grant Park	-7216	1	-14433	-28865	-43298
	-5870	2	-11740	-23480	-35219
	-4524	3	-9047	-18094	-27141
Jonesboro	-7217	1	-14434	-28869	-43303
	-5561	2	-11122	-22243	-33364
	-3904	3	-7809	-15617	-23426
Merrionette Park	-6128	1	-12255	-24510	-36765
	-5208	2	-10417	-20833	-31250
	-4289	3	-8578	-17157	-25735
Mounds	-9100	1	-18200	-36400	-54600
	-8340	2	-16680	-33359	-50038
	-7579	3	-15159	-30318	-45476

Table 8 (con't)

	The Annual Direct Change in Disposable Income		The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 4)	The Annual Change in Disposable Income (multiplier of 6)
Nokomis	-21494	1	-42988	-85976	-128964
	-18360	2	-36721	-73441	-110162
	-15227	3	-30453	-60906	-91359
Pleasant Hill	-4175	1	-8349	-16698	-25047
	-3683	2	-7365	-14731	-22096
	-3191	3	-6382	-12764	-19145
South Beloit	23553	1	47106	94212	141318
	28157	2	56314	112628	168942
	32761	3	65522	131044	196566
S. Chicago Heights	-8418	1	-16837	-33673	-50509
	-8715	2	-17429	-34859	-52288
	-9011	3	-18022	-36044	-54066
5,000-9,999					
Fairfield	-17095	1	-34190	-68380	-102569
	-14056	2	-28112	-56223	-84335
	-11017	3	-22034	-44067	-66101
Hoopeston	-47963	1	-95926	-191853	-287779
	-43685	2	-87370	-174471	-262111
	-39407	3	-78814	-157628	-236443
Jerseyville	-54059	1	-108118	-216236	-324354
	-48169	2	-96338	-192675	-289013
	-42279	3	-84557	-169114	-253671
Mt. Carmel	-21961	1	-43921	-87843	-131764
	-17394	2	-34778	-69576	-104364
	-12827	3	-25655	-51310	-76964
10,000-24,999					
Deerfield	-221313	1	-442626	-885253	-1327880
	-211120	2	-422240	-844481	-1226720
	-200927	3	-401854	-803709	-1205560
Libertyville	-109293	1	-218586	-437173	-655759
	-96625	2	-193250	-386499	-579749
	-83957	3	-167913	-335826	-503739

Table 8 (con't)

	The Annual Direct Change in Disposable Income		The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 4)	The Annual Change in Disposable Income (multiplier of 6)
Sterling	885	1	1769	3539	5308
	6852	2	13704	27407	41111
	12819	3	25638	51276	76914
25,000+					
Addison	-242506	1	-485012	-970024	-1455040
	-254073	2	-508145	-1016290	-1524440
	-265639	3	-531279	-1062560	-1593840
Carbondale	-78900	1	-157799	-315598	-473398
	-36077	2	-72155	-144309	-216464
	6745	3	13490	26980	40470
Chicago Heights	64358	1	128715	257430	386146
	60003	2	120006	240013	360019
	55649	3	111297	222595	333892
Moline	-288827	1	-577653	-1155310	-1732960
	-219850	2	-439700	-879401	-1319100
	-150874	3	-301748	-603495	-905243
Mt. Prospect	-74567	1	-149133	-298267	-447400
	-65427	2	-130854	-261708	-392562
	-56287	3	-112575	-225150	-337725
Naperville	-528086	1	-1056170	-2112340	-3168510
	-479272	2	-958543	-1917090	-2875630
	-430458	3	-860915	-1721830	-2582750
Palatine	-93640	1	-187280	-374561	-561841
	-80912	2	-161825	-323649	-485474
	-68185	3	-136369	-272738	-409107
SANITARY DISTRICTS					
Bloomington-Normal	-94903	1	-189806	-379613	-569419
	-4500	2	-9001	-18001	-27002
	85903	3	171805	343610	515416
Danville	233566	1	467132	934264	1401400
	315157	2	630313	1260630	1890940
	396747	3	793495	1586990	2380480

Table 8 (con't)

	The Annual Direct Change in Disposable Income		The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 4)	The Annual Change in Disposable Income (multiplier of 6)
De Kalb	-51801	1	-103603	-207205	-310808
	-16242	2	-32484	-64967	-97451
	19318	3	38636	77271	115107
Springfield	-318133	1	-636266	-1272530	-1908800
	-191375	2	-382750	-765499	-1148250
	-64617	3	-129233	-258467	-387700
Urbana-Champaign	509637	1	-1019270	-2038550	-3057820
	634879	2	-1269760	-2539520	-3809270
	760121	3	-1520240	-3040480	-4560720
SUBTOTALS	-1781108		-3562216	-7124432	-10686648
MUNICIPALITIES	-1573613		-3147226	-6294452	-9441678
	-1349431		-2698862	-5397724	-8096586
SUBTOTALS	278366		556732	1113464	1670196
SANITARY	737919		1475838	2951676	4427514
DISTRICTS	1170492		2340984	4681968	7022952
TOTALS	-1502742		-3005484	-6010968	-9016452
	-835694		-1671388	-3342776	-5014164
	-178939		-357878	-715756	-1073634

Governmental user classes. For the municipalities of Chicago Heights, Farina, South Beloit and Sterling and the sanitary districts of Danville and Urbana-Champaign, local disposable income is higher regardless of the shifting assumption. For Chicago Heights this is due to a substantial shifting of costs by the user charge system from the Residential to the Industrial class of user. In the municipality of South Beloit, O,M,&R costs are shifted by the user charge system from both the Residential and Commercial classes to the Industrial class. User charge systems in Farina and Sterling achieve reductions in O,M,&R costs borne by Residential and Commercial classes by shifting costs to both the Industrial class and the Institutional/Governmental class. The user charge systems in the Danville and Urbana-Champaign sanitary district shift O,M,&R costs from the Residential and Commercial classes to the Industrial and Institutional/Governmental classes.

Federal Tax Increases and Grant Amounts

The next set of calculations estimate the proportion of the federal grants returned to the federal government through increased tax revenues for each municipality and sanitary district. For these calculations, assume that the real costs for O,M,&R will remain constant over time. Also, assume no change in the federal and state tax structures or the distributions of the property tax or user charge billings. If these conditions are met, the federal government will receive a constant annual increase in tax revenues in 1983 dollars over the life of the project. It represents the annual revenue gain to the federal government due to the fact that the city is prevented from financing O,M,&R through a tax deductible revenue source. The annual amount received by the federal government from the City of Example is $18,810. This could be thought of as an annual payment on an installment loan.

Annual Direct Financial Benefit of a Federal Grant

The receipt of a federal grant provides residents of a city or sanitary district with a financial benefit through a reduction in the locally borne construction costs. The financial benefit of a federal grant which is paid in a lump sum or sums can be annualized using Appendix H. This annual direct financial benefit will be greater the greater the real interest rate and the shorter the project life.

To calculate the annual direct financial benefit, the factors in Appendix H must be multiplied by the grant amount in 1983 dollars. Since comparing 24 estimates of annual financial benefit for each grant recipient is tedious and confusing, only three estimates are used. The smallest annual financial benefit is obtained with a 2 percent real interest rate and a 30-year life, while the largest annual financial benefit is obtained with a 9 percent real interest rate and a 20-year project life. For a "middle" range estimate, a 4 percent real interest rate and a 25-year project life is also used.

Price Adjustments for Grant Amounts

For these calculations, it is necessary to convert grant amounts into 1983 dollars. Grant amounts and the year they were received are available from the GICS printout. Grant payments are made in several steps. For some grants, all payments have not been made. If an award was approved for a portion of a project, it was treated as paid in the same year as the target date of completion. If not approved, it was treated as not paid. In the event the award is eventually approved, the estimates are overstatements since the actual grant amount is larger than the estimated grant amount. Some sample units also have applied for additional grants. These were not included in the estimated grant amounts.

The next step is to convert these estimated grant amounts into 1983 dollars. The EPA's Financial Capability Guidebook, March 1984, includes two

construction price indices: the EPA Construction Cost Index for Small City Conventional Treatment Plants and the EPA Complete Urban Sewer System Cost Index. The Complete USS Cost Index is used to adjust cost estimates for pump stations, interceptor sewers and collection sewers. These indices span the period 1973 to 1983 (3rd Quarter). Since some grant awards are to be made in the future, the necessary price adjustments had to be estimated for future years. For 1984, the construction cost indices are assumed to increase at the same rate as the CPI. Beyond 1984, the annual rate of increase in construction costs is assumed to be 3 percent. The price adjustments are reported in Appendix I.

Using codes from the EPA FOAMRS printout it is possible to determine whether the grant was for treatment facilities only, collection and conveyance only, or treatment, collection, and conveyance facilities. For grants for treatment facilities, the price adjustment to 1983 dollars used the price index for treatment plants. If the grant was for only collection and conveyance, with no treatment facilities, the price adjustment used is based on the Complete USS Cost Index. If the grant was for treatment, collection, and conveyance facilities, the largest of the other two price adjustments was used. This is a conservative treatment since it leads to the largest estimates of the grant amount in 1983 dollars and the largest estimates of annual financial benefit of the grant.

Estimates of Increase in Federal Tax Revenues as a Proportion of Grant Amounts

Table 9 reports the annual increase in federal tax revenue, the annual direct financial benefit of the grant and the proportion of the federal grant returned to the federal government through increased tax revenues. The annual direct financial benefit and the proportion of the grant returned through increased tax revenues are reported for both the 75 percent and 55 percent

federal cost shares and for the three sets of real interest rates and project lives.

The proportion of the grant returned through increased federal tax revenues is greater the smaller the federal cost share, the longer the project life and the smaller the real interest rate. Under the previous assumptions, these proportions represent the number of dollars returned to the federal government for each grant dollar received. They are also the proportions of the total federal grant returned through increased federal tax revenues over the project's life.

For all but one of the municipalities and sanitary districts, the change from the property tax to a system of user charges increases the federal income tax liability of sewerage system users. The exception is the municipality of Chicago Heights for which the proportions reported in Table 9 are negative as a consequence. This is due to a very pronounced shift of O,M,&R charges from Residential to Commercial and Industrial users. These users can deduct them as business expenses which reduces federal tax revenues.

The proportions vary greatly among both municipalities and sanitary districts. This is to be expected since there is considerable variation in the classes of property, classes of sewerage user and marginal tax rates among the sample units. The subtotals at the end of Table 9 do indicate a systematic difference between municipalities and sanitary districts. Municipalities, as a group, return a 65 percent greater proportion of the total federal grants they received than do sanitary districts as a group. The chief reason for this is that O,M,&R costs as a proportion of total grants received are greater for municipalities. While total grant amounts received in 1983 dollars are nearly the same for municipalities and sanitary districts, total O,M,&R costs in 1983 dollars for municipalities are 58 percent greater

than for sanitary districts.

The estimated proportion of the federal grant returned through increased federal tax revenues varies greatly with the real rate of interest and the length of project life. In total, the sample units return an estimated 32.9, 13.4, and 22.9 percent of total grants received for real interest rates and project lives of 2 percent and 30 years, 9 percent and 20 years, and 4 percent and 25 years, respectively.

A decrease in the federal cost share from 75 to 55 percent increases the proportion of the grant returned as increased federal tax revenue by 36 percent for every grant. For the sample units as a group this increases the proportions 32.9 to 44.8. 13.4 to 18.3, and 22.9 to 31.3

Net Financial Benefits

The final set of calculations estimate the net annual financial benefit of the grants for the sample units. This is an estimate of the annual direct benefit to the municipality or sanitary district of accepting a federal grant with the required system of user charges over financing the federal cost share themselves and financing both debt services and O,M,&R costs with the property tax. It is assumed that exactly the same project with the same project and O,M,&R costs would have been built regardless of the method of finance.

To estimate this net annual financial benefit, the annual direct financial benefits of the grant reported in Table 9 must be adjusted to reflect the direct reductions in local disposable income reported in Table 8. The net annual financial benefits are reported in Tables 10 and 11 for each municipality and sanitary district.

A total of fourteen municipalities have negative estimated net annual financial benefits. None of the sanitary districts have negative estimated net annual financial benefits. The implication is that these municipalities, under the assumptions, are better off financing the federal share themselves

TABLE 9

Proportion of Federal Grant Returned Through Increased Tax Revenues

1. 2% real interest rate and 30 year project life
2. 9% real interest rate and 20 year project life
3. 4% real interest rate and 25 year project life

	Annual Change in Federal Tax Revenue		Annual Direct Financial Benefit of the Grant		Change in Federal Tax Revenue as a Proportion of the Financial Benefit	
			5%	55%	75%	55%
Example	18,810	1	19,691	14,440	.955	1.303
		2	48,310	35,427	.389	.531
		3	28,229	20,701	.666	.909
MUNICIPALITIES						
Less than 1,000						
Albers	3,076	1	22,022	16,150	.140	.190
		2	54,030	39,622	.057	.078
		3	31,572	23,153	.097	.133
Bryant	1,480	1	1,517	1,112	.976	1.327
		2	3,722	2,729	.397	.543
		3	2,175	1,595	.681	.929
Farina	964	1	746	547	1.292	1.757
		2	1,830	1,342	.526	.718
		3	1,070	784	.902	1.230
Fillmore	1,416	1	44,925	32,945	.032	.044
		2	110,222	80,830	.013	.018
		3	64,407	47,232	.022	.030
Flat Rock	2,995	1	17,491	12,827	.171	.233
		2	42,914	31,470	.070	.095
		3	25,076	18,389	.119	.163
Grantfork	1,857	1	32,912	24,136	.056	.076
		2	80,749	59,216	.023	.031
		3	47,184	34,602	.039	.053
Marine	5,184	1	2,285	1,676	2.269	3.086
		2	5,606	4,111	.923	1.262
		3	3,276	2,402	1.584	2.160

Table 9 (con't)

	Annual Change in Federal Tax Revenue		Annual Direct Financial Benefit of the Grant		Change in Federal Tax Revenue as a Proportion of the Financial Benefit	
			75%	55%	75%	55%
Prairie Du Rocher	2,070	1	7,743	5,679	.267	.363
		2	18,998	13,932	.109	.148
		3	11,101	8,141	.186	.254
Shipman	4,186	1	40,621	29,789	.103	.140
		2	99,662	73,086	.042	.057
		3	58,236	42,707	.072	.098
Tamms	3,607	1	8,545	6,266	.422	.574
		2	20,965	15,374	.172	.235
		3	12,251	8,984	.295	.402
Vergennes	2,641	1	24,991	18,327	.106	.144
		2	61,314	44,964	.043	.059
		3	35,828	26,274	.074	.101
Waynesville	2,465	1	24,755	18,154	.100	.136
		2	60,736	44,540	.041	.056
		3	35,490	26,026	.070	.095
Willow Hill	3,048	1	37,523	27,517	.081	.110
		2	92,060	67,511	.033	.045
		3	53,794	39,449	.057	.077
1,000-4,999						
Cobden	3,921	1	39,213	28,756	.100	.136
		2	96,206	70,551	.041	.056
		3	56,217	41,226	.070	.095
Grant Park	5,672	1	82,735	60,672	.069	.094
		2	202,985	148,856	.028	.038
		3	118,612	86,982	.048	.066
Jonesboro	5,985	1	19,792	14,514	.302	.411
		2	48,559	35,610	.123	.168
		3	28,375	20,808	.211	.288
Merrionette Park	2,705	1	7,262	5,326	.372	.506
		2	17,818	13,067	.151	.207
		3	10,412	7,635	.260	.354
Mounds	4,418	1	2,386	1,750	1.852	2.519
		2	5,854	4,293	.754	1.030
		3	3,421	2,508	1.293	1.763

Table 9 (con't)

	Annual Change in Federal Tax Revenue		Annual Direct Financial Benefit of the Grant		Change in Federal Tax Revenue as a Proportion of the Financial Benefit	
			75%	55%	75%	55%
Nokomis	15,590	1	65,100	47,740	.239	.325
		2	159,720	117,128	.097	.133
		3	93,330	64,442	.167	.228
Pleasant Hill	3,498	1	22,840	16,750	.153	.208
		2	56,037	41,094	.062	.085
		3	32,745	24,013	.107	.146
South Beloit	5,230	1	17,840	13,083	.293	.398
		2	43,770	32,098	.119	.163
		3	25,576	18,756	.205	.279
S. Chicago Heights	6,887	1	998	717	6.904	9.389
		2	2,398	1,759	2.810	3.839
		3	1,401	1,028	4.819	6.573
5,000-9,999						
Fairfield	18,851	1	212,156	155,581	.089	.121
		2	520,515	381,711	.036	.049
		3	304,156	223,048	.062	.085
Hoopeston	27,063	1	85,375	62,609	.317	.431
		2	209,464	153,607	.129	.176
		3	122,398	89,758	.221	.302
Jerseyville	33,238	1	317,952	233,165	.105	.143
		2	780,080	572,059	.043	.058
		3	455,829	334,275	.073	.100
Mt. Carmel	24,231	1	162,014	118,810	.150	.204
		2	397,493	291,495	.061	.083
		3	232,269	170,331	.105	.143
10,000-24,999						
Deerfield	191,244	1	239,114	175,350	.800	1.088
		2	586,655	430,214	.326	.455
		3	342,804	251,390	.558	.762
Libertyville	88,785	1	255,873	187,640	.347	.472
		2	627,772	460,366	.141	.193
		3	366,830	269,008	.242	.330

Table 9 (con't)

	Annual Change in Federal Tax Revenue		Annual Direct Financial Benefit of the Grant		Change in Federal Tax Revenue as a Proportion of the Financial Benefit	
Sterling	27,377	1	296,204	217,216	.092	.125
		2	726,722	532,929	.037	.051
		3	424,650	311,410	.064	.088
25,000+						
Addison	178,256	1	279,775	205,168	.637	.866
		2	686,414	503,371	.259	.354
		3	401,097	294,138	.445	.606
Carbondale	46,129	1	255,171	187,125	.181	.246
		2	626.050	459,103	.074	.101
		3	365,824	268,271	.126	.172
Chicago Heights	-2,802	1	56,619	43,721	-.047	-.064
		2	146,272	107,266	-.019	-.026
		3	85,472	62,680	-.033	-.045
Moline	230,850	1	235,667	172,822	.980	1.333
		2	578,198	424,012	.399	.545
		3	337,862	247,765	.684	.933
Mt. Prospect	44,565	1	46,354	33,993	.961	1.307
		2	113,728	83,401	.391	.534
		3	66,455	48,734	.671	.915
Naperville	363,419	1	38,089	27,932	9.541	12.976
		2	93,450	68,530	3.883	5.305
		3	54,606	40,044	6.660	9.083
Palatine	72,947	1	500,870	367,305	.146	.199
		2	1,288,860	901,165	.059	.081
		3	718,068	526,583	.102	.139
SANITARY DISTRICTS						
Bloominton-Normal	188,232	1	442,657	324,615	.425	.578
		2	1,086,040	796,427	.173	.236
		3	634,611	465,381	.297	.405
Danville	97,864	1	707,230	518,635	.138	.188
		2	1,735,160	1,272,450	.056	.077
		3	1,013,910	743,537	.096	.131
De Kalb	80,234	1	424,606	311,378	.189	.257
		2	1,041,750	763,951	.077	.105
		3	608,733	446,404	.132	.180

Table 9 (con't)	Annual Change in Federal Tax Revenue		Annual Direct Financial Benefit of the Grant		Change in Federal Tax Revenue as a Propoertion of the Financial Benefit	
Springfield	285,622	1	839,710	615,391	.340	.462
		2	2,058,860	1,509,830	.138	.189
		3	1,203,070	882,250	.237	.324
Urbana-Champaign	264,140	1	1,265,050	927,702	.209	.284
		2	3,103,740	2,276,070	.085	.116
		3	1,813,620	1,329,990	.146	.199
SUBTOTALS	1,451,885		3,528,167	2,587,306	.412	.561
MUNICIPALITIES			8,656,138	6,347,837	.168	.229
			5,058,097	3,705,235	.287	.392
SUBTOTALS	916,062		3,679,253	2,697,721	.249	.340
SANITARY			9,025,550	6,618,728	.101	.138
DISTRICTS			5,273,944	3,867,562	.174	.237
TOTALS	2,367,947		7,207,420	5,285,027	.329	.448
			17,681,688	12,966,565	.134	.183
			10,332,041	7,572,797	.229	.313

TABLE 10

Annual Net Financial Benefit
for 75 Percent Federal Cost Sharing

1. 50 percent of the commercial change in O,M,&R charges shifted to the residential class of users
2. 75 percent of the commercial change in O,M,&R charges shifted to the residential class of users
3. 100 percent of the commercial change in O,M,&R charges shifted to the residential class of users

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
MUNICIPALITIES				
Less than 1,000				
Albers	10818	1	32849	17391
	11669	2	34746	18554
	12521	3	36644	19718
Bryant	-970	1	652	-486
	-739	2	940	-238
	-508	3	1229	10
Farina	1088	1	1586	1237
	1874	2	2429	2039
	2660	3	3271	2842
Fillmore	24868	1	64714	36756
	28626	2	73174	41917
	32385	3	81734	47078
Flat Rock	6974	1	23478	11898
	7899	2	25394	13119
	8823	3	27310	14339
Grantfork	22733	1	57966	33245
	23439	2	59944	34330
	24144	3	61923	35416
Marine	-5304	1	-2994	-4615
	-4959	2	-2574	-4248
	-4615	3	-2154	-3880
Prairie du Rocher	3220	1	11587	5717
	3495	2	12123	6069
	3770	3	12658	6421

Table 10 (con't)	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
Shipman	24931	1	67625	37669
	25893	2	69811	38996
	26856	3	71997	40324
Tamms	884	1	10117	3639
	920	2	10221	3695
	956	3	10324	3751
Vergennes	14787	1	40994	22606
	15238	2	41887	23189
	15688	3	42781	23772
Waynesville	14635	1	41049	22516
	14948	2	41690	22927
	15261	3	42332	23338
Willow Hill	-554	1	11411	3016
	-326	2	12014	3356
	-100	3	12618	3695
1,000-4,999				
Cobden	21123	1	60433	32851
	24401	2	66736	37032
	27679	3	73039	41212
Grant Park	44090	1	118661	66339
	50239	2	131791	74570
	56338	3	144921	82802
Jonesboro	5889	1	24938	11572
	8663	2	29336	14831
	11437	3	33735	18090
Merrionette Park	-2107	1	3736	-364
	-700	2	5852	1254
	707	3	7968	2873
Mounds	-7569	1	-5343	-6905
	-6695	2	-4305	-5982
	-5822	3	-3267	-5095
Nokomis	24841	1	92187	44934
	31096	2	102977	52542
	37350	3	113767	60149

Table 10 (con't)

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project-Life
Pleasant Hill	12482	1	36692	19705
	13991	2	39679	21655
	15500	3	42667	23605
South Beloit	32815	1	46228	36832
	38267	2	52962	42652
	43719	3	59647	48471
S. Chicago Heights	-7819	1	-6947	-7559
	-8064	2	-7117	-7781
	-8308	3	-7287	-8004
5,000-9,999				
Fairfield	120031	1	319337	179494
	134749	2	351029	199276
	149466	3	382720	219058
Hoopeston	5450	1	83083	28612
	13023	2	95445	37614
	20596	3	107807	46615
Jerseyville	157647	1	465353	249452
	184269	2	522107	285064
	210891	3	578860	320675
Mt. Carmel	83838	1	237610	129716
	96493	2	262023	145879
	109149	3	286435	162043
10,000-24,999				
Deerfield	-82200	1	119993	-21875
	-68051	2	139892	-6011
	-53902	3	159791	9854
Libertyville	31752	1	236753	92914
	52925	2	270289	117776
	74099	3	303824	142638
Sterling	177997	1	435422	254800
	199164	2	478680	282558
	220330	3	521938	310316

Table 10 (con't)

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
25,000+				
Addison	-101345	1	103825	-40132
	-106964	2	106851	-43172
	-112584	3	109876	-46212
Carbondale	78617	1	307560	146923
	147621	2	414619	227281
	216626	3	521677	307639
Chicago Heights	101306	1	155008	117328
	100140	2	158478	117545
	98975	3	161948	117763
Moline	-149438	1	53157	-88993
	-67959	2	152808	-2093
	13520	3	252458	84808
Mt. Prospect	-53015	1	-21691	-43670
	-40619	2	-4561	-29861
	-28222	3	12570	-16052
Naperville	-506154	1	-474276	-496643
	-455948	2	-422048	-445834
	-405743	3	-369821	-395025
Palatine	179035	1	575356	297279
	217909	2	652232	347490
	256783	3	729107	397701
SANITARY DISTRICTS				
Bloomington-Normal	181181	1	582456	300902
	304559	2	753763	438580
	427938	3	925070	576258
Danville	628424	1	1202330	799650
	751350	2	1385340	940501
	874276	3	1568340	1081350
De Kalb	211256	1	593597	325328
	280193	2	711047	408739
	349131	3	828498	492151
Springfield	211573	1	981476	441275
	404669	2	1270990	663138
	597765	3	1560510	885001

Table 10 (con't)

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project-Life
Urbana-Champaign	1331920	1	2527070	1688490
	1553260	2	2888090	1951510
	1774461	3	3249120	2214530
SUBTOTALS	285326		3328107	1193561
MUNICIPALITIES	686017		3934384	1587431
	1086425		4187531	2142748
SUBTOTALS				
SANITARY	2564354		5886929	3555645
DISTRICTS	3294031		7009230	4302468
	4023571		8131538	5249290
TOTALS	2849680		9215036	4749206
	3980048		10943614	5889899
	5109996		12319069	7392038

TABLE 11

Annual Net Financial Benefit for 55 Percent Federal Cost Sharing

1. 50 percent of the commercial change in O,M,&R charges shifted to the residential class of users
2. 75 percent of the commercial change in O,M,&R charges shifted to the residential class of users
3. 100 percent of the commercial change in O,M,&R charges shifted to the residential class of users

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
MUNICIPALITIES				
Less than 1,000				
Albers	6776	1	22932	11596
	7435	2	24359	12484
	8095	3	25785	13373
Bryant	-1268	1	-78	-913
	-1047	2	184	-680
	-827	3	447	-447
Farina	997	1	1362	1106
	1772	2	2179	1894
	2547	3	2996	2681
Fillmore	17558	1	46778	26276
	20453	2	53122	30200
	23348	3	59465	34124
Flat Rock	3946	1	16049	7557
	4689	2	17519	8517
	5431	3	18988	9476
Grantfork	16269	1	42106	23977
	16741	2	43512	24728
	17213	3	44917	25479
Marine	-5728	1	-4034	-5222
	-5397	2	-3648	-4875
	-5066	3	-3261	-4528
Prairie du Rocher	1685	1	7821	3516
	1912	2	8239	3800
	2139	3	8657	4083

Table 11 (con't)

	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
Shipman	17098	1	48407	26439
	17836	2	50042	27445
	18574	3	51677	28450
Tamms	-810	1	5961	1210
	-786	2	6034	1249
	-762	3	6107	1287
Vergennes	9978	1	29197	15712
	10348	2	29891	16179
	10718	3	30586	16645
Waynesville	9789	1	29159	15568
	10042	2	29653	15893
	10295	3	30147	16217
Willow Hill	-2749	1	6025	-131
	-2591	2	6460	110
	-2433	3	6894	350
1,000 - 4,999				
Cobden	13911	1	42738	22511
	16634	2	47679	25896
	19358	3	52621	29282
Grant Park	30408	1	85094	46724
	35277	2	95081	53120
	40145	3	105069	59515
Jonesboro	2394	1	16363	6562
	4870	2	20032	9393
	7346	3	23698	12225
Merrionette Park	-3179	1	1107	-1901
	-1903	2	2902	-469
	-626	3	4699	963
Mounds	-7977	1	-6345	-7490
	-7134	2	-5381	-6610
	-6290	3	-4417	-5731
Nokomis	12485	1	61872	27220
	17907	2	70621	33634
	23330	3	79369	40049

Table 11 (con't)	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project-Life
Pleasant Hill	8040	1	25794	13337
	9278	2	28116	14899
	10516	3	30438	16460
South Beloit	30345	1	40218	33291
	35571	2	46347	38786
	40797	3	52477	44282
South Chicago Heights	-7979	1	-7339	-7788
	-8237	2	-7543	-8030
	-8496	3	-7747	-8272
5,000 - 9,999				
Fairfield	83464	1	229622	127070
	95067	2	253673	142388
	106671	3	277724	157705
Hoopeston	-8794	1	48137	8192
	-2099	2	58344	15934
	4595	3	68550	23676
Jerseyville	101192	1	326843	168516
	122286	2	370033	196202
	143379	3	413223	223888
Mt. Carmel	55625	1	168391	89269
	66123	2	187512	102340
	76622	3	206632	115411
10,000-24,999				
Deerfield	-119297	1	28978	-75059
	-106203	2	46289	-60707
	-93109	3	63600	-46355
Libertyville	-5860	1	144474	38992
	13045	2	172445	60602
	31951	3	200416	82213
Sterling	130767	1	319545	187089
	147881	2	352859	209036
	164994	3	386173	230983

Table 11 (con't)	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
25,000 +				
Addison	-138988	1	11470	-94098
	-146193	2	10604	-99412
	-153398	3	9738	-104726
Carbondale	36613	1	204504	86704
	98635	2	294433	157052
	160658	3	384362	227400
Chicago Heights	91453	1	130834	103202
	89437	2	132218	102201
	87422	3	133602	101199
Moline	-186608	1	-38039	-142282
	-108463	2	53432	-60161
	-30318	3	144903	21959
Mt. Prospect	-58762	1	-35791	-51909
	-47234	2	-20791	-39345
	-35706	3	-5792	-26781
Naperville	-512002	1	-488625	-505028
	-462168	2	-437308	-454751
	-412333	3	-385991	-404474
Palatine	106322	1	396957	193034
	138223	2	456727	233249
	170125	3	516496	273465
SANITARY DISTRICTS				
Bloomington-Normal	107558	1	401827	195354
	222143	2	551559	320425
	336729	3	701292	445497
Danville	523128	1	943994	648494
	635032	2	1099960	773743
	746935	3	1255920	898791
De Kalb	141107	1	421490	224760
	201144	2	517104	295411
	261181	3	612717	366062
Springfield	70318	1	634913	238766
	245724	2	881027	435268
	421130	3	1127140	631770

Table 11 (con't)	Two Percent Real Interest Rate 30 year Project Life		Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
Urbana-Champaign	1112640	1	1989090	1374130
	1308360	2	2287240	1600410
	1504080	3	2585390	1826690
SUBTOTALS	-266031		2755480	400258
MUNICIPALITIES	71510		2495858	784299
	436902		3033247	1210529
SUBTOTALS	1954751		4391314	2681704
SANITARY DISTRICTS	2396959		5325720	3425257
	3270055		6282459	4168810
TOTALS	1688720		7146794	3081962
	2468469		7821578	4209556
	3706957		9315706	5379339

if they collected the revenues for debt service and O,M,&R costs through the property tax.

For the four municipalities of Marine, Mounds, Naperville and South Chicago Heights, the estimated net annual financial benefits are negative for all three real rates of interest and project lives, for both 75 and 55 percent federal cost shares and for all three shifting assumptions. These cities have O,M,&R costs which are a large proportion of grants received in 1983 dollars. The other ten sample municipalities are each different in terms of the conditions under which there are negative annual net financial benefits. Table 12 summarizes the conditions under which each of the 14 municipalities have negative estimated annual net financial benefits.

For a real interest rate of 2 percent and a project life of 3 years, all fourteen municipalities have negative estimated annual net financial benefits for at least one set of assumptions concerning the federal cost share and commercial cost shifting. The municipalities of Tamms, Hoopeston, and Libertyville only have negative net financial benefits with a 55 percent federal cost share.

For a real interest rate of 9 percent and a project life of 20 years, the municipalities of Marine, Mounds. South Chicago Heights, Moline, Mount Prospect and Naperville all have negative net financial benefits. Moline has negative net financial benefits only with a 55 percent federal cost share and 50 percent shifting of commercial costs. Mount Prospect has negative net financial benefits except when the federal cost share is 75 percent and commercial cost shifting is 100 percent.

Only the municipalities of Tamms, Hoopeston and Libertyville have all positive net financial benefits when the real interest rate is 4 percent and the projected life is 25 years. Willow Hill has negative net financial

TABLE 12

Summary of the Conditions for Negative Estimated Net Financial Benefits

1. 50 percent of the net change in costs shifted to the residential class.

2. 75 percent of the net change in costs shifted to the residential class.

3. 100 percent of the net change in costs shifted to the residential class.

		2% Real Interest Rate 30 Year Project Life Federal Cost Shares		9% Real Interest Rate 20 Year Project Life Federal Cost Shares		4% Real Interest Rate 25 Year Project Life Federal Cost Shares	
		.75	.55	.75	.55	.75	.55
Less than 1,000							
Bryant	1	x	x			x	x
	2	x	x			x	x
	3	x	x				x
Marine	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x	x	x	x	x
Tamms	1		x				
	2		x				
	3		x				
Willow Hill	1	x	x				x
	2	x	x				
	3	x	x				
1,000 - 4,999							
Merrionette Pk.	1	x	x			x	x
	2	x	x				x
	3		x				
Mounds	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x	x	x	x	x
S. Chicago Hts.	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x	x	x	x	x

Table 12 (con't)

		.75	.55	.75	.55	.75	.55
5,000 - 9,999							
Hoopeston	1		x				
	2		x				
	3						
10,000 - 24,999							
Deerfield	1	x	x			x	x
	2	x	x			x	x
	3	x	x				x
Libertyville	1		x				
	2						
	3						
25,000 +							
Addison	1	x	x			x	x
	2	x	x			x	x
	3	x	x			x	x
Moline	1	x	x		x	x	x
	2	x	x			x	x
	3		x				
Mt. Prospect	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x		x	x	x
Naperville	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x	x	x	x	x

benefits only when federal cost sharing is 55 percent and commercial cost shifting is 50 percent.

Table 13 indicates the number and proportion of municipalities by population size that have negative net financial benefits for each set of assumptions. Generalizations are hazardous since the sample size for each population class is small, particularly for the population ranges 5,000-9,999 and 10,000-24,999. Still, it is obvious that a decrease in the proportion of federal cost sharing will increase the number of municipalities with negative net financial benefits. One oddity is that, on average, an increase in the proportion of the change in commercial costs shifted to the residential class decreases the number of municipalities with negative financial benefits. This suggests that cities in which costs decrease for the commercial class of users are more likely to also have negative net financial benefits.

Per Capita Estimates

Grants and the annual change in federal taxes per capita are listed in Table 14 by population size for municipalities and for sanitary districts. All sanitary districts serve populations greater than 25,000. Per Capita grants range from a high of $625.46 for municipalities of less than 1,000 residents to a low of $87.43 for municipalities of more than 25,000 residents. There is a tendency for per capita grants to decline with population size, although the pattern is not uniform.

The increase in annual federal taxes per capita range from a low of $2.65 for municipalities of 25,000 residents or more to a high of $6.12 for municipalities with 10,000-24,999 residents with no obvious pattern.

Table 15 lists the annual changes in local disposable income per capita for each assumption concerning the shifting of costs from commercial to residential users. Per capita local disposable income is lower for municipalities regardless of population size or shifting assumption. For

TABLE 13

Number and Proportion of Sample Municipalities Which Have Negative Net Financial Benefits

1. 50 percent of the net change in costs shifted to the residential class.

2. 75 percent of the net change in costs shifted to the residential class.

3. 100 percent of the net change in costs shifted to the residential class.

	2% Real Interest Rate 30 Year Project Life Federal Cost Shares		9% Real Interest Rate 20 Year Project Life Federal Cost Shares		4% Real Interest Rate 25 Year Project Life Federal Cost Shares	
	.75	.55	.75	.55	.75	.55
Less than 1,000						
1	3 (.231)	4 (.308)	1 (.077)	1 (.077)	2 (.154)	3 (.231)
2	3 (.231)	4 (.308)	1 (.077)	1 (.077)	2 (.154)	2 (.154)
3	3 (.231)	4 (.308)	1 (.077)	1 (.077)	1 (.077)	2 (.154)
1,000 - 4,999						
1	3 (.333)	3 (.333)	2 (.222)	2 (.222)	3 (.333)	3 (.333)
2	3 (.333)	3 (.333)	2 (.222)	2 (.222)	2 (.222)	3 (.333)
3	2 (.333)	3 (.333)	2 (.222)	2 (.222)	2 (.222)	2 (.222)
5,000 - 9,999						
1	0	1 (.25)	0	0	0	0
2	0	1 (.25)	0	0	0	0
3	0	0	0	0	0	0
10,000 - 24,999						
1	1 (.333)	2 (.667)	0	0	1 (.333)	1 (.333)
2	1 (.333)	1 (.333)	0	0	1 (.333)	1 (.333)
3	1 (.333)	1 (.333)	0	0	0	1 (.333)
25,000 +						
1	4 (.571)	4 (.571)	2 (.286)	3 (.429)	4 (.571)	4 (.571)
2	4 (.571)	4 (.571)	2 (.286)	2 (.286)	4 (.571)	4 (.571)
3	3 (.429)	4 (.571)	1 (.143)	2 (.286)	3 (.429)	3 (.429)
TOTAL						
1	11 (.306)	14 (.389)	5 (.139)	6 (.167)	10 (.278)	11 (.306)
2	11 (.306)	13 (.361)	5 (.139)	5 (.139)	9 (.250)	10 (.278)
3	9 (.250)	12 (.333)	4 (.111)	5 (.139)	6 (.167)	8 (.222)

TABLE 14

Grants and the Annual Change in Federal Taxes Per Capita in 1983 Dollars

Population Size	Grants	Change in Annual Federal Taxes
MUNICIPALITIES		
less than 1,000	$ 625.46	$5.01
1,000-4,999	218.34	2.75
5,000-9,999	443.72	3.59
10,000-24,999	258.70	6.12
25,000+	87.43	2.65
SANITARY DISTRICTS	174.78	3.51

TABLE 15

Annual Changes in Local Disposable Income Per Capita in 1983 Dollars

1. 50 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
2. 75 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
3. 100 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.

Population		The Annual Direct Change in Disposable Income	The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 2)	The Annual Change in Disposable Income (multiplier of 2)
MUNICIPALITIES					
Less than 1,000	1	-7.02	-14.04	-21.06	-42.12
	2	-6.69	-13.38	-26.76	-40.14
	3	-6.34	-12.68	-25.36	-38.04
1,000-4,999	1	-2.35	-4.70	-9.40	-14.10
	2	-1.38	-2.76	-5.52	-8.28
	3	-.94	-1.88	-3.76	-5.64
5,000-9,999	1	-4.90	-9.80	-19.60	-29.40
	2	-4.28	-8.56	-17.12	-25.68
	3	-3.67	-7.34	-14.68	-22.02
10,000-24,999	1	-6.03	-12.06	-24.12	-36.18
	2	-5.99	-11.98	-23.96	-25.94
	3	-5.42	-10.84	-21.68	-32.52
25,000+	1	-4.67	-9.34	-18.68	-28.02
	2	-4.04	-8.08	-16.16	-24.24
	3	-3.42	-6.84	-13.68	-20.52
SANITARY DISTRICTS	1	+.81	+1.62	+3.24	+4.86
	2	+2.13	+4.26	+8.52	+12.78
	3	+3.39	+6.78	+13.56	+20.34

sanitary districts, per capita local disposable income is higher regardless of the shifting assumption.

Annual net financial benefits per capita for 75 and 55 percent federal cost sharing are presented in Tables 16 and 17, respectively. As in the case of per capita grants, there is an erratic pattern that suggests annual net financial benefits tend to decline with population size of the municipality. For municipalities of greater than 25,000 residents, some estimates are negative with 75 percent federal cost sharing. At a two percent real interest rate and 30 year project life, annual net financial benefits are negative with both 50 and 75 percent shifting of commercial costs to residential users. The estimate is negative when the real interest rate is 4 percent and project life is 25 years only for 50 percent shifting of changes in commercial costs to residential users.

A reduction in federal cost sharing from 75 to 55 percent reduces annual net financial benefits substantially in all cases. Municipalities of 25,000 or more residents are still the only one with negative estimates of net benefit. Now, however, the estimates are also negative for a two percent real interest rate and 30 year project life regardless of the shifting assumption. For a four percent real interest rate and 25 year project life, the estimates are positive only for 100 percent shifting of commercial costs.

Conclusions

This study estimates the impact on a sample of 36 municipalities and 5 sanitary districts of the federal grant requirement that grant recipients employ a system of nondeductible user charges. This requirement changes local annual disposable income, local federal income tax liabilities and the ultimate annual financial benefit of the grant. It is estimated that changes in the method of financing sewerage O,M,&R costs from a property tax to a

TABLE 16

Annual Net Financial Benefit Per Capita for 75 Percent Federal Cost Sharing

1. 50 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
2. 75 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
3. 100 percent of the change in O,M,&R charges to commercial users shifted to the residential

Population		Two Percent Real Interest Rate 30 year Project Life	Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
MUNICIPALITIES				
Less than 1,000	1	16.90	51.67	27.68
	2	18.33	54.64	29.15
	3	19.73	57.63	31.03
1,000-4,999	1	6.31	18.91	10.09
	2	7.71	21.32	11.77
	3	9.11	23.73	13.47
5,000-9,999	1	12.75	38.41	20.41
	2	14.89	42.76	23.21
	3	17.03	47.11	26.00
10,000-24,999	1	2.54	15.77	6.49
	2	3.66	17.70	7.85
	3	4.69	19.62	9.21
25,000+	1	-1.70	2.63	-.41
	2	-.77	3.82	.64
	3	.15	3.68	1.69
SANITARY DISTRICTS	1	7.42	17.03	10.29
	2	9.53	20.28	12.45
	3	11.64	23.52	15.18

TABLE 17

Annual Net Financial Benefit Per Capita for 55 percent Federal Cost Sharing

1. 50 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
2. 75 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.
3. 100 percent of the change in O,M,&R charges to commercial users shifted to the residential user class.

Population		Two Percent Real Interest Rate 30 year Project Life	Nine Percent Real Interest Rate 20 year Project Life	Four Percent Real Interest Rate 25 year Project Life
MUNICIPALITIES				
Less than 1,000	1	10.53	36.03	18.14
	2	11.65	38.29	19.60
	3	12.78	40.56	21.07
1,000-4,999	1	4.00	31.61	7.13
	2	5.22	15.20	7.68
	3	6.43	17.15	9.63
5,000-9,999	1	8.04	26.86	13.66
	2	9.41	30.22	15.87
	3	11.51	33.57	18.09
10,000-24,999	1	.11	9.81	3.01
	2	1.09	11.38	4.16
	3	2.07	12.94	5.37
25,000+	1	-2.46	.68	-1.54
	2	-1.65	1.84	-.64
	3	-.80	3.00	.33
SANITARY DISTRICTS	1	5.65	12.70	7.76
	2	6.93	15.41	9.91
	3	9.46	18.17	12.06

system of user charges reduce local annual disposable income in 31 of the municipalities and one of the sanitary districts. Five municipalities and four of the sanitary districts benefit from the change in revenue systems through increased local annual disposable income. This is due to a shifting of O,M,&R costs to users who in turn shift them to nonresidents. Per capita local disposable income is decreased in all population size categories of municipalities and is increased for sanitary districts as a group.

In terms of local annual federal tax liabilities, only one municipality, Chicago Heights, is estimated to pay less in federal taxes. All other sample units pay more in estimated annual federal taxes. The increase in annual federal taxes per capita ranges from a low of $2.65 in municipalities of 25,000 or more to a high of $6.12 in municipalities of 10,000-24,999 residents. While there is considerable variation between sample units, municipalities pay greater amounts in annual federal taxes per grant dollar received than do sanitary districts. For a 4 percent real interest rate and 25 year project life with 75 percent federal cost sharing, municipalities pay an additional 28.7 cents per grant dollar and sanitary districts pay an additional 17.4 cents per grant dollar. The average for all sample units is an additional .329 dollars per grant dollar. If these same projects were funded with a federal cost share of 55 percent, these estimated would increase by approximately 36 percent.

The estimates of annual direct net financial benefit address the issue of whether a sample unit gains or loses when it accepts a federal grant. Assuming the federal cost share and O,M,&R costs would be financed with the property tax if the federal grant were not accepted, nine municipalities have negative direct net financial benefit. This assumes the federal cost share is 75 percent and the real interest rate and project life are 4 percent and 25 years, respectively. With a federal cost share of 55 percent, 10

municipalities have negative direct net financial benefits. Despite the negative impacts on local annual disposable income for most sample units, the impact of a federal grant on the unit is positive for many of them. In per capita terms, only municipalities of 25,000 or more residents have negative annual financial benefits and then only under certain conditions.

These estimates of annual direct net financial benefit suggest that municipalities should be cautious and not assume a federal grant is always preferrable to local financing. This may be especially true with the reduction in the federal cost share, although the impact of a reduction in the federal cost share was not dramatic for the current sample.

The estimates of the impact of a switch from the property tax to a system of user charges on annual local disposable income also are of potential concern. This impact if the same whether the change is voluntary or mandatory. Again, it seems careful consideration needs to be given prior to a change to a system of user charges whether a federal grant is the reason or not.

Recommendations for Further Study

The estimates in this study certainly point to potentially adverse impact on recipients of federal grants due to the nondeductibility of user charges. These impacts raise potentially serious issues which should be dealt with. Making user charges tax deductible is one approach to the issues raised. However, this study does not support such a change in tax laws for all user charge systems, only ones applicable to sewerage O,M,&R and then not for every municipality. What it does potentially support is an expansion or, at least, no further reductions in budgets for federal grants for wastewater treatment. This follows from the estimates of the increased federal tax revenues.

The estimates of changes in local annual disposable income and net direct financial benefits are certainly potentially significant. The current report

demonstrates that a switch from the property tax to user charges to financing sewerage treatment may not be beneficial whether the switch is voluntary or mandatory. The estimates of annual net direct financial benefit suggest that, potentially, municipalities need to carefully weigh the benefits of acceptance of a federal grant if it requires a shift from the property tax to a system of user charges.

The chief limitation of the current study is that data on the method of financing sewerage treatment prior to the receipt of the federal grant were not available. It is important to make clear that this is not due to lack of desire on the part of municipalities to provide information. But, as a review of the calculations shows, the study requires detailed historical information. Units in the survey simply do not have the information readily available and/or are not sure how to obtain it.

The methodology employed in this study can be readily extended to other FOAMRS municipalities and sanitary districts. All that is required is access to Illinois and U.S. EPA files and a computer program. However, the current recommendation is that, first, a careful study be made to determine a method for obtaining the necessary detailed information on financing O,M,&R charges prior to the receipt of the federal grant. Also, verification that the definitions of user classes used by the EPA and the county assessors are similar is necessary. The effort should be concentrated on the sample units in this study to limit the expense involved.

With this detailed information, it would be possible to clearly demonstrate any adverse impacts on municipalities due to the mandatory user charge system. There would be no side issue of whether or not the revenue system in place prior to the receipt of the grant was the property tax. However, even without this, the current study demonstrates that municipalities should be cautious when altering their revenue systems.

ENDNOTES

[1]There are specific situations in which ad valorem taxes can be used to finance the wastewater treatment system. The taxes must have been in effect in December 1977, must have involved a separate tax rate and must have been designated as "dedicated" by the regional administrator of the U.S. Environmental Protection Agency. To meet this test, the taxes must pass several requirements.

[2]U.S. Bureau of the Census, General Population Characteristics, Washington, D.C.: U.S. Government Printing Office, 1981), PC80-1, B15, Table 23.

[3]U.S. Bureau of the Census, General Social and Economic Characteristics (Washington, D.C.: U.S. Government Printing Office, 1981), PC80-1, C15, section 1, Table 57.

[4]U.S. Bureau of the Census, General Social and Economic Characteristics (Washington, D.C.: U.S. Government Printing Office, 1981), PC80-1, C15, section 1, Table 57.

[5]U.S. Bureau of the Census, Summary Characteristics for Government Units and Standard Metropolitan Statistical Areas (Washington, D.C.: U.S. Government Printing Office, 1982) PHC80-3-15, Table 2.

LIST OF APPENDICES

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APPENDIX A

CITIES WITH CURRENT EXPENDITURES FOR SEWERAGE TREATMENT AND COLLECTING USER CHARGES

MUNICIPALITIES

Abingdon
Addieville
Addison
Albany
Albers
Aledo
Algonquin
Alhambra
Allendale
Alsip
Altamont
Alton
Altona
Amboy
Andalusia
Antioch
Arthur
Ashland
Assumption
Astoria
Atlanta
Auburn
Baldwin
Bardolph
Barry
Bartlett
Batavia
Beardstown
Belleville
Belvidere
Bensenville
Bethalto
Bethany
Bloomingdale
Bloomington
Blue Mound
Bluffs
Bluford
Bolingbrook
Breese
Bridgeview
Buffalo Grove
Cahokia
Camp Point
Canton
Carbon Cliff
Carbondale
Carlinville
Carol Stream
Carpentersville
Cary
Cave in Rock
Central City
Centralia
Chapin
Chatham
Chatsworth
Chenoa
Cherry Valley
Chicago
Chicago Ridge
Chillicothe
Chrisman
Cicero
Clinton
Cobden
Coffeen
Collinsville
Colona
Columbia
Cortland
Country Club Hills
Cowden
Creal Springs
Crystal Lake
Cuba
Dahlgren
Dakota
Dalton City
Dalzell
Danville
Davis
Deerfield
DeSoto
Divernon
Dongola
Dunlap
Dupo
Dwight
East Hazelcrest
East Moline
Easton
East Peoria
Edgewood
Edinburg
Edwardsville
Effingham
Eldorado
Elizabethtown
Elk Grove Village
Elkville
Ellis Grove
Elmhurst
Enfield
Eureka
Evanston
Fairbury
Fairview
Farina
Farmersville
Farmington
Fillmore
Findlay
Flat Rock
Forest Park
Forreston
Fox Lake
Franklin Park
Freeburg
Freeport
Fulton
Galena
Galva
Geneva
Georgetown
Germantown Hills
Gifford
Gillespie
Gilman
Girard
Glen Carbon
Glendale Heights
Glen Ellyn
Goreville
Gorham
Grand Tower
Grandview
Granite City
Grant Park
Greenup
Greenville
Gurnee
Hamel
Hamilton
Hampshire
Hampton
Hanover Park
Harrisburg
Harristown
Harvey
Hecker
Herrin
Herscher
Highland
Hillsboro
Hoffman
Homewood
Hoopeston
Hoyleton
Humboldt
Huntley
Hurst
Ina
Industry
Irving
Irvington
Jacksonville
Johnston City
Joliet
Kampsville
Kankakee
Kenilworth
Kewanee
Kincaid
Kirmundy
La Grange
La Harpe
Lakemoor
Lakewood
La Salle

MUNICIPALITIES

Larwenceville
Lebanon
Lena
Lenzburg
Le Roy
Liberty
Libertyville
Lincoln
Lindenhurst
Lisle
Litchfield
Livingston
Lombard
London Mills
Macomb
Manteno
Maquon
Marion
Markham
Marseilles
Marshall
Martinsville
Mason
Matherville
Matteson
Mattoon
McHenry
Mendon
Mendota
Meredosia
Milford
Milledgeville
Moline
Momence
Monmouth
Morrison
Morrisonville
Morton
Mt. Carroll
Mt. Morris
Mt. Olive
Mt. Prospect
Mt. Vernon
Mt. Zion
Moweaqua
Mulberry Grove
Mundelein
Murrayville
Naperville
Nashville
Nebo
Neoga
New Baden
New Berlin
New Lenox
Niantic
Noble
Normal
Northbrook
North Pekin
Oak Lawn
Oak Park
Oakwood
Oblong
Odell
O'Fallon
Olney
Olympia Fields
Orion
Ottawa
Palestine
Palmyra
Palos Hills
Panama
Pekin
Peoria
Peotone
Perry
Peru
Plainville
Pocahontas
Pontiac
Princeton
Prophetstown
Quincy
Rankin
Rantoul
Red Bud
Richmond
Ridgeway
Riverside
Riverwoods
Rock City
Rock Falls
Rock Island
Rockton
Rolling Meadows
Romeoville
Roselle
Rossville
Round Lake Beach
Round Lake Park
St. Charles
St. Libory
Ste. Marie
St. Peter
Sandwich
Savanna
Seneca
Sesser
Shabbona
Shawneetown
Shelbyville
Sigel
Silvis
Smithton
Sorento
South Roxana
Sparta
Springfield
Sterling
Stewardson
Stonington
Strasburg
Streator
Swansea
Table Grove
Tamaroa
Tamms
Taylorville
Teutopolis
Thebes
Thornton
Tilden
Tower Hill
Trenton
Troy
Tuscola
Victoria
Vienna
Villa Grove
Villa Park
Virginia
Warren
Warrensburg
Warrenville
Washington
Washington Park
Watago
Waterloo
Watson
Wauconda
Wayne City
West Chicago
West Frankfort
Wheaton
Williamsville
Willow Hill
Willow Springs
Windsor
Wood Dale
Woodlawn
Woodridge
Wood River
Woodson
Woodstock
Worden
Zeigler

SANITARY DISTRICTS

Aurora
Ashley
Beach Park
Beardstown
Bloomington/Normal
Bonnie Brae Forest
Brimfield

SANITARY DISTRICTS (con't)

Clinton
Commonfields
Danville
De Kalb
Downer's Grove
Elgin
Galesburg
Highland Hills
Hillsdale
Hinsdale
Island Lake
Joppa
Kimber Trails
Kimberly Heights
La Grange
Lake-in-the-Hills
Lakes Region
Liberty
Lockport
Lou-Del
Macon
Metropolitan
Mission Brook
Newark
Norris
Northfield
Oak Highlands
Greater Peoria
Piasa
Plum Grove Woodlands
Rockford
Rockton
Rosewood
Salt Creek
Seward
Sheridan
South Lyons
South Palos
South Stickney
Spoon Valley Lake
Springfield
Taylorville
Urbana
Vermont
Westville
Wheaton
Williamsfield
Yorkville

APPENDIX B

FEDERAL RESIDENTIAL MARGINAL TAX RATES

CITY	PER CAPITA INCOME	PERSONS HOUSEHOLD	FAMILY INCOME	EXEMP.	TAXABLE INCOME	MARG TAX RATE
Addison	8,521	3.08	26,245	3,080	23,165	22
Albers	6,181	3.19	19,717	3,190	16,527	18
Blmngtn-Nor S.D.	7,794	2.48	19,329	2,480	16,849	18
Bryant	6,883	2.78	19,135	2,780	16,355	18
Carbondale	5,271	2.24	11,807	2,240	9,567	14
Chicago Hghts	6,795	3.06	20,793	3,060	17,733	18
Cobden	5,309	2.54	13,485	2,540	10,945	14
Deerfield	14,195	3.22	45,708	3,220	42,488	33
De Kalb S.D.	6,405	2.41	15,436	2,410	13,026	16
Fairfield	6,568	2.29	15,041	2,290	12,751	16
Farina	7,318	2.31	16,905	2,310	14,595	16
Fillmore	5,364	2.36	12,659	2,360	10,299	14
Flat Rock	5,803	2.68	15,552	2,680	12,872	16
Grant Park	7,304	2.76	20,159	2,760	17,399	18
Grantfork	6,388	2.91	18,589	2,910	15,679	16
Hoopeston	6,524	2.63	17,158	2,630	14,528	16
Jerseyville	6,921	2.58	17,856	2,580	15,276	16
Jonesboro	5,950	2.50	14,875	2,500	12,375	16
Libertyville	10,908	3.09	33,706	3,090	30,616	28
Marine	6,703	2.82	18,902	2,820	16,082	18
Merrionette Pk	8,511	2.20	18,724	2,200	16,524	18
Moline	9,131	2.51	22,919	2,510	20,409	22
Mounds	3,901	2.63	10,260	2,630	7,630	14
Mt. Carmel	7,540	2.55	19,227	2,550	16,677	18
Mt. Prospect	10,767	2.80	30,148	2,800	27,348	25
Naperville	11,142	3.18	35,432	3,180	32,252	28
Nokomis	6,767	2.36	15,970	2,360	13,610	16
Palatine	10,844	3.00	32,532	3,000	29,532	25
Pleasant Hill	5,584	2.36	13,178	2,360	10,818	14
Pr'ie DuRocher	5,479	2.73	14,958	2,730	12,228	16
Shipman	6,339	2.85	18,066	2,850	15,216	16
S. Beloit	6,633	2.57	17,047	2,570	14,477	16
S. Chicago Hts	7,114	2.67	18,994	2,670	16,324	18
Sterling	8,323	2.63	21,889	2,630	19,259	18
Tamms	5,003	2.48	12,407	2,480	9,927	14
Urbana	6,717	2.32	15,583	2,320	13,263	16
Urb-Cham S.D.	7,311	2.36	17,254	2,360	14,894	16
Vergennes	6,444	2.75	17,721	2,750	14,971	16
Waynesville	6,502	2.71	17,620	2,710	14,910	16
Willow Hill	5,164	2.89	14,924	2,890	12,034	16

Source: U.S. Bureau of the Census, Summary Characteristics for Governmental Units and Standard Metropolitan Areas, PHC80-30-14 (1982) and General Social and Economic Characteristics PC80-1 C-15 (1981).

APPENDIX C

SCHEDULE Y--MARRIED INDIVIDUALS

Joint Returns and Surviving Spouses

Taxable Income Over	But Not Over	Pay	% on + Excess	of the Amount over--
$ 0--$	3,400	$ 0	0	---
3,400--	5,500	0	11	3,400
5,500--	7,600	231	12	5,500
7,600--	11,900	483	14	7,600
11,900--	16,000	1,085	16	11,900
16,000--	20,200	1,741	18	16,000
20,200--	24,600	2,497	22	20,200
24,600--	29,900	3,465	25	24,600
29,900--	35,200	4,790	28	29,900
35,200--	45,800	6,274	33	35,200
45,800--	60,000	9,772	38	45,800
60,000--	85,600	15,168	42	60,000
85,600--	109,400	25,920	45	85,600
109,400--	162,400	36,630	49	109,400
162,400--	---	62,600	50	162,400

Source: U.S. Department of Treasury, Internal Revenue Service.

APPENDIX D

Cities Listed on FOAMRS Report

MUNICIPALITIES

Abingdon
Addieville
Addison
Albers
Algonquin
Alton
Annawan
Antioch
Arthur
Auburn
Aviston
Barrington
Beecher City
Belleville
Bensenville
Bethalto
Bourbonnais
Bradley
Breese
Bridgeview
Brimfield
Bryant
Buckley
Bureau
Bushnell
Camp Point
Carbondale
Carpentersville
Casey
Centralia
Chicago Heights
Cissna Park
Cobden
Cowden
Crete
De Soto
Deerfield
Dolton
Duquion
East Moline
East St. Louis
Edgewood
Effingham
El Paso
Elburn
Elwood
Fairfield
Farina
Farmersville
Fillmore
Flat Rock
Forsyth
Fox River
Freeburg
Fulton
Galena
Galva
Gibson City
Gilman
Glen Ellyn
Glenwood
Goodfield
Granite City
Grant Park
Grantfork
Grayville
Hanover Park
Hanover
Hickory Hills
Highland
Hoffman Estates
Hoopeston
Hoyleton
Humboldt
Illiopolis
Jerseyville
Jonesboro
Justice
Kenilworth
Knoxville
Lake Villa
Lansing
Lebanon
Lena
Leroy
Libertyville
Lincoln
Litchfield
Mahomet
Marine
Marseilles
Mason
Mattoon
Merrionette Park
Milledgeville
Minok
Moline
Momence
Monmouth
Montrose
Mounds
Mount Prospect
Mt. Carmel
Mt. Carroll
Mt. Sterling
Mt. Vernon
Naperville
Neoga
Nilwood
Noble
Nokomis
Northbrook
O'Fallon
Ogden
Olmsted
Olney
Palatine
Pana
Park Forest
Patoka
Piper City
Plano
Pleasant Hill
Pocahontas
Prairie Du Rocher
Princeville
Rapids City
Richmond
Ridgeway
Robinson
Salem
Sauget
Scales Mound
Seneca
Sherrard
Shipman
Silvis
Smithton

MUNICIPALITIES

South Beloit
South Chicago Heights
Sparta
St. Charles
St. Clair
St. Elmo
Steger
Sterling
Stillman
Stockton
Stone Park
Streamwood
Sycamore
Tamms
Toluca
Trenton
Troy
Urbana
Waukegan
Wauconda
Vergennes
Waynesville
West Chicago
West Dundee
Westfield
Wheaton
Williamsville
Willow Hill
Winfield
Winnetka
Wood Dale
Worth

SANITARY DISTRICTS

Aurura
Bloomington-Normal
Brimfield
Danville
Decatur
De Kalb
Elgin
Galesburg
Hinsdale
Metro S.D.
of Greater Chicago
North Shore S.D.
Rockford
Salt Creek
Sangamon Valley
South Palos Twp.
Springfield
Taylorville
Thorn Creek Basin
Urbana-Champaign
Wheaton

OTHER

Godfrey Twp.
Lake County DPW

APPENDIX E

PRICE ADJUSTMENTS FOR O,M,&R COSTS

Year Data Reported	Cost Index	Price Adjustment
1974	1.00	2.14
1975	1.13	1.90
1976	1.21	1.76
1977	1.30	1.64
1978	1.41	1.52
1979	1.55	1.37
1980	1.75	1.22
1981	1.94	1.10
1982	2.06	1.04
1983	2.14	1.00
1984	2.21	.97

Source: U.S. Environmental Protection Agency, Financial Capability Guidebook, March 1984.

APPENDIX F

DISTRIBUTION OF USER CHARGES BY CLASS OF USER

CITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	INST/GOV
Less than 1,000				
Albers	85.9%	13.1%	0 %	1.0%
Bryant	98.0	1.5	0	0.5
Farina	38.8	9.2	48.0	4.0
Fillmore	82.5	9.5	0	8.1
Flat Rock	82.0	13.1	0	4.9
Grantfork	76.7	19.1	0	4.2
Marine	89.8	6.6	1.1	2.5
Prairie Du Rocher	89.5	8.0	0	2.5
Shipman	85.5	8.0	0	6.5
Tamms	96.0	2.8	0.1	1.1
Vergennes	92.3	1.4	0	6.3
Waynesville	96.8	1.6	0	1.6
Willow Hill	92.5	4.7	0	2.8
1,000-4,999				
Cobden	88.0	5.0	0	7.0
Grant Park	74.9	12.5	8.5	4.2
Jonesboro	82.3	6.6	0	11.1
Merrionette Park	99.1	.6	0	0.2
Mounds	89.0	11.0	0	0
Nokomis*	87.5	9.2	0	3.3
Pleasant Hill	81.7	13.3	1.3	3.7
South Beloit	36.4	13.9	49.8	0
S. Chicago Hts	64.4	29.2	6.1	0.2
5,000-9,999				
Highland	74.3	25.9	0	0
Hoopeston	84.9	7.8	7.3	0
Fairfield	67.1	18.4	10.1	4.4
Jerseyville	79.2	20.8	0	0
Mt. Carmel	71.1	13.5	12.8	2.5
10,000-24,999				
Deerfield	94.1	0	5.9	0
Libertyville	83.8	0	16.2	0
Sterling	53.2	15.9	24.7	6.3
25,000 +				
Addison	57.3	14.6	17.1	0
Carbondale	66.0	18.3	15.4	23.0
Hanover Park				
DuPage	93.3	6.1	0	0.6
Cook	91.2	7.3	0	1.5

CITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	INST/GOV
Palatine	80.0%	7.6%	4.9%	7.5%
Chicago Hts*	16.7	37.4	45.2	0
Naperville	97.1	0	2.9	0
Wheaton	68.6	16.4	1.2	13.7
Moline	78.8	2.2	18.9	0
Mount Prospect	82.9	11.4	5.5	0.3
Urbana-Champaign	41.4	17.4	16.1	25.0*
Danville	41.1	11.7	44.7	2.4*
De Kalb	65.4	11.4	7.6	14.9
Bloomington-Normal	65.9	7.1	14.8	12.1
Springfield	75.1	8.8	8.6	7.5

Source: U.S. and Illinois Environmental Protection Agency Files.

APPENDIX G

DISTRIBUTION OF PROPERTY TAX BY CLASS OF USER

CITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
Less than 1,000			
Albers	.786	.165	.034
Bryant	.863	.131	.004
Farina	.436	.258	.304
Fillmore	.560	.346	.093
Flat Rock	.703	.192	.103
Grantfork	.841	.131	.027
Marine	.820	.115	.063
Prairie Du Rocher	.858	.114	.025
Shipman	.839	.102	.057
Tamms	.880	.026	.093
Vergennes	.858	.060	.080
Waynesville	.881	.045	.073
Willow Hill	.253	.034	.710
1,000-4,999			
Cobden	.701	.255	.043
Grant Park	.636	.293	.070
Jonesboro	.676	.278	.045
Merrionette Park	.529	.339	.130
Mounds	.657	.228	.114
Nokomis	.758	.236	.004
Pleasant Hill	.768	.214	.016
South Beloit	.522	.234	.242
South Chicago Heights	.641	.266	.091
5,000-9,999			
Fairfield	.660	.271	.068
Highland	.755	.195	.049
Hoopeston	.675	.190	.133
Jerseyville	.659	.321	.020
Mt. Carmel	.698	.252	.049
10,000-24,999			
Deerfield	.854	.103	.041
Libertyville	.700	.192	.106
Sterling	.625	.259	.115
25,000 +			
Addison	.614	.113	.272
Carbondale	.495	.493	.010
Chicago Heights	.647	.270	.082
Hanover Park	.691	.237	.071
Naperville	.726	.211	.061
Palatine	.609	.289	.099
Wheaton	.840	.157	.003

Appendix G (con't)

CITY	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
Moline	.645	.282	.071
Mount Prospect	.449	.349	.259
Champaign-Urbana	.613	.374	.013
Danville	.557	.295	.147
De Kalb	.569	.387	.044
Bloomington-Normal	.599	.376	.025
Springfield	.597	.399	.004

Source: Illinois Department of Revenue, 1982 Property Tax Statistics, (Springfield, IL: 1982).

APPENDIX H

FACTORS USED TO ANNUALIZE FEDERAL GRANTS

Real Interest Rate (Percent)	LIFE OF PROJECT IN YEARS		
	20	25	30
2	.0611567	.0512203	.0446499
3	.0672157	.0574278	.0510192
4	.0735817	.0640119	.0578301
5	.0802425	.0709524	.0650514
6	.0871845	.0782267	.0726489
7	.0943929	.0858105	.0805864
8	.1018522	.0936787	.0888274
9	.1095464	.1018062	.0980557

APPENDIX I

PRICE ADJUSTMENTS FOR GRANTS

Year Grant Received	PRICE ADJUSTMENTS		
	Treatment Only	Collection Only	Both Treatment and Collection
1973	2.11	2.27	2.27
1974	1.75	2.06	2.06
1975	1.78	1.85	1.85
1976	1.65	1.72	1.72
1977	1.53	1.59	1.59
1978	1.35	1.47	1.47
1979	1.24	1.30	1.30
1980	1.17	1.23	1.23
1981	1.09	1.12	1.12
1982	1.05	1.04	1.05
1983	1.00	1.00	1.00
*1984	.97	.97	.97
**1985	.94	.94	.94
**1986	.91	.91	.91
**1987	.89	.89	.89

*Construction costs assumed to increase at same rate as Consumer Price Index.

**Construction costs assumed to increase at an annual rate of three percent.

Source: U.S. Environmental Protection Agency, Financial Capability Guidebook, March 1984.

REPORT DOCUMENTATION PAGE	1. REPORT NO. ILENR/RE-EA-85/07	2.	3. Recipient's Accession No.

4. Title and Subtitle
Trade-Off Between Local and Federal Funding for Wastewater Treatment Facilities

5. Report Date
November, 1985

6.

7. Author(s)
Warren Jones, Norman Walzer and David L. Chicoine

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Public Policy Research Institute
Western Illinois University
Macomb, Illinois 61455

10. Project/Task/Work Unit No.
EA64 85/7005

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
Illinois Department of Energy and Natural Resources
Energy and Environmental Affairs Division
325 West Adams St.
Springfield, IL 62706 (217) 785-2800

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This study examines the question of whether municipalities benefit by employing a user charge in conjunction with a federal grant to finance a wastewater treatment facility. An analysis is given outlining the effects on a local community of financing wastewater treatment facilities with user charges as compared to property taxes.

17. Document Analysis a. Descriptors
Illinois
Financing
Sewage Treatment
Taxes
Municipalities

b. Identifiers/Open-Ended Terms
Sanitary Districts
User Charges
Federal Grants

c. COSATI Field/Group

18. Availability Statement No restriction on distribution. Available at the depository libraries or from National Technical Information Services, Springfield, Virginia 22161

19. Security Class (This Report) Unclassified

21. No. of Pages 104

20. Security Class (This Page) Unclassified

22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

UNIVERSITY OF ILLINOIS-URBANA
3 0112 084230975